Examining Psycho-Behaviourally Based Features of Effective Talent Development

by

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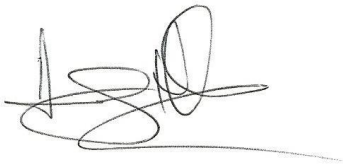
Signature of Candidate 

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Abstract

Given sport's increasing political, economic, and social importance, there is an obvious need to develop sporting talent in an efficacious and efficient manner. However, despite their widespread adoption, many talent development systems suffer from poor predicative validity, with a lack of supporting empirical evidence. This thesis sought to identify the key issues associated with effective talent development through both the examination of extant literature and empirical study. First, a series of semi-structured, qualitative interviews were conducted with sporting academy directors, coaches, and clinical psychologists to identify the issues impacting upon development. Wide support was found for the appropriate deployment of Psychological Characteristics of Developing Excellence (PCDEs) throughout, along with several other adaptive constructs. A range of factors deemed maladaptive to talent development were also identified, including issues around mental health. Furthermore, some characteristics were seen to be either adaptive or maladaptive, dependent upon context (termed 'dual-effect'). Based on these results, and furthering the existing work of MacNamara and Collins (2011), a new psychometric assessment tool was developed to help facilitate effective talent development.

Following a process of item generation, cognitive interviews, pilot studies, and exploratory factor analysis, the 7 factor, 88 item Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2) was developed. The PCDEQ2 accounted for 40% of response variance, and was subsequently able to accurately predict 72.9% of group membership (i.e., differentiate between those likely to progress to elite sport and those less likely). Accordingly, the PCDEQ2 is able to offer coaches and practitioners an empirically derived, valid and practical way to

formatively assess the key psychological constructs that underpin effective talent development, thus informing effective intervention.

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1. INTRODUCTION

The purpose of this thesis was to examine the range of key psycho-behaviourally based features that influence effective talent development, with a view to informing and improving practice. Accordingly, my original contribution to knowledge is the development and validation of the Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2); a psychometric assessment tool used to formatively assess and monitor key psycho-behavioural factors proven to impact upon development processes. Once assessed, coaches, psychologists, programme managers, and practitioners alike can formulate interventions designed to optimise these processes.

1.1 Establishing the Context

Talent identification and development has received significant attention (not to mention funding) in recent years, in terms of both research and applied practice. Despite this attention, however, many such talent development systems have been criticised for their poor predictive validity and lack of empirical support (Bailey & Collins, 2013; Collins & Bailey, 2013; Faber, Bustin, Oosterveld, Elferink-Gemser, & Nijhuis-Van Der Sanden, 2015; Phillips, Davids, Renshaw, & Portus, 2010; Vaeyens, Gullich, Warr, & Philippaerts, 2009; Vaeyens, Lenoir, Williams, & Philippaerts, 2008). Accordingly, research has sought to address this issue from different epistemological stances, offering a range of models of talent development (e.g., Côté, 1999; Gagné, 2013; Renshaw, Davids, Phillips, & Kerhervé, 2012; Simonton, 1999; Vaeyens et al., 2008). However, the literature – and indeed applied practice – relating to talent identification and development is not without its issues.

In examining the literature, it becomes apparent that talent is conceptualised differently by different authors, blurring the lines between ability and potential. For

example, while some recognise talent as a non-linear process that cannot be predicted from an early age (e.g., Abbott, Button, Pepping, & Collins, 2005), other authors imply otherwise through their assumptions and definitions (e.g., Höner & Feichtinger, 2016). Without such clear and explicit definitions of what constitutes talent, it is perhaps of little surprise that talent identification and development systems offer varying levels of success. Similarly, there is a degree of ambiguity within the literature around what talent looks like. While many studies seek to identify talent through physiological and anthropometrical profiling (e.g., Bullock et al., 2009; Till et al., 2016), others argue that the true determinants of talent are psychological characteristics and behaviours (e.g., MacNamara & Collins, 2013; van Yperen, 2009). To obfuscate matters even further, some suggest that simply applying purposeful effort for a long duration is enough to achieve expertise (e.g., Ericsson, Krampe, & Tesch-Römer, 1993; Helsen, Starkes, & Hodges, 1998). Conversely, not only does it matter who you parents were (Eynon et al., 2011; Sharp, 2008), but when you are born influences your chance of success (Till et al., 2010), and where you are born may be even more influential (Côté, MacDonald, Baker, & Abernethy, 2006). Somewhat problematically, such conflicting research leaves practitioners and researchers alike asking the question: if we don't know what we are looking for, how do we know when we see it!?

1.2 Aims of the Thesis

Given such valid concerns, there is an obvious need for clarity and direction within talent identification and development research, in order for it to inform practice effectively. Whilst recognising much of the positive work already undertaken in the field of talent identification and development – particularly the research around psycho-

behavioural characteristics[1] – the lack of predictive validity within development systems suggests a research-practice divide still remains. The reasons for such a dichotomy are not necessarily explicit (Abbott & Collins, 2004), but given such varied empirical opinion, are likely to revolve around three main areas: a lack of conceptual clarity around the definition of talent; poor understanding (and therefore application) of the mechanisms that underpin talent development; and practical limitations to the implementation of good practice. Accordingly, this thesis seeks to address these issues through the following aims and objectives:

- Provide conceptual clarity to talent and its development
- Identify the key mechanisms underpinning effective talent development
- Explore and establish the key psycho-behavioural characteristics associated with effective talent development.
- Develop a psychometric assessment tool that measures these key constructs – both adaptive and maladaptive – to facilitate formative assessment.
- Provide coaches and applied practitioners with a validated tool that offers both discriminative power and practical utility.

1.3 Programme of Work

In reviewing the literature, Chapter 2 seeks to address Objectives 1 and 2 by reviewing the concept of talent, considering aspects of both current ability and future potential. Once defined, the underpinning mechanisms of talent development are examined in detail, acknowledging different epistemological positions. Finally, the key characteristics and determinants of talent are identified, along with scope for improving the efficacy of talent development. The following three chapters then looks to address

[1] This is systematically addressed in subsequent chapters

Objective 3. Chapter 3 is a qualitative investigation into the psycho-behavioural features associated with effective talent development in an applied setting, identifying both adaptive and maladaptive characteristics adopted by successful and unsuccessful athletes. Likewise, Chapter 4 uses semi-structured, qualitative interviews with clinical psychologists to further investigate the impact clinical issues and mental health have on talent development processes. Chapter 5 seeks to address the nature of dual effect constructs, paying particular attention to the role of fear of failure as both a key motivator and an inhibiting factor.

Following a brief review of findings in Chapter 6 that establishes the need for an appropriate measure, Chapter 7 sets out to develop and initially validate a psychometric assessment tool that assesses the psycho-behavioural characteristics identified earlier. Through the process of exploratory factor analysis, the seven-factor, 88 item PCDEQ2 is developed, whereby characteristics influential to talent development can be measured. Subsequently, Chapter 8 assesses the PCDEQ2's ability to differentiate between athletes likely to achieve elite sporting success and those less likely to, through discriminant function analysis. Finally, Chapter 9 reviews the thesis holistically, and addresses the practicalities associated with administering the PCDEQ2 and using it to inform practice.

2. TALENT DEVELOPMENT: WHAT IS IT, HOW DOES IT WORK, AND HOW CAN WE MAKE IT BETTER?

2.1 Introduction

Given sport's ever increasing economic, political and social value (Baker, Cobley, & Schorer, 2012), the race to identify and develop the next generation of athletic talent has never been more intense. Spiralling competition between teams – and indeed sports – has led to a great level of financial investment in talent identification and development (TID) systems, with a view to recruiting and developing the best prospective talent in an attempt to guarantee future success. Worryingly, however, despite their widespread adoption (Bailey & Collins, 2013; Williams & Reilly, 2000), such systems have often been criticised for their limited predictive validity (Durand-Bush & Salmela, 2001; Faber et al., 2015; Phillips et al., 2010; Vaeyens et al., 2008), and lack of appropriate supporting empirical evidence (Collins & Bailey, 2013; Vaeyens et al., 2009). If such financial investments are to be worthwhile, then there is a clear and obvious need for evidence-based protocols that accurately identify those athletes most likely to succeed at elite level; which raises the question: why is this not the currently the case?

In light of such considerations, the aim of this chapter is threefold. First, a clear definition of what constitutes "talent" is offered, considering aspects of both current ability and future potential. Second, once defined, the underpinning mechanisms behind its development are examined in detail, incorporating differing epistemological interpretations. Drawing on these findings, the final aim is to identify the key characteristics and determinants of talent, their respective roles in the talent

development process, and identifying scope for making talent development more efficacious.

2.2 Defining "Talent"

In order to address such a question, it is perhaps pertinent to start by examining and clarifying what exactly talent *is*, and in what context. For example, in business parlance – and in particular the domain of human resources – the word 'talent' is often used as a collective noun for employees. In this context, a professional rugby player would be considered a 'talent', irrespective of their relative ability. Perhaps more appropriately, the *Oxford English Dictionary* defines the word talent as "a natural aptitude or skill", or a person possessing those attributes. Using this definition, the same player may or may not be considered 'talented', depending on their level of ability; essentially separating the 'world beaters' from the 'bench warmers'. Yet even this dictionary definition of the word still presents some problems when set against the context of developing athletes.

The term 'natural aptitude' implies a high level of ability, along with a lack of (or limited) susceptibility to training. In adopting such a dictionary definition, a young athlete who demonstrates a greater aptitude than his peers at an early age would not only be deemed talented, but the wider implication suggests that this advantage would be maintained over time due to its innate nature. Were this truly the case, sport would be awash with examples of talented youngsters who outperformed their peers at every stage, right the way through to elite senior level. The reality, however, is very different. For example, within football, Martindale, Collins, and Daubney (2005) report that only Terry Venables and Michael Owen had represented England at every age level of football (i.e., from England schoolboys through to full senior level). Furthermore, sport is littered with examples of young athletes expected to be the next big thing, but who

failed to live up to that promise. For every Wayne Rooney there are likely dozens of Robbie Cottons, and the fact you'll have to Google the name only adds weight to the point[1]. Conversely, cases where athletes have gone unnoticed for long periods of time prior to a *seemingly* rapid rise in achievement are commonplace, such as footballer Jamie Vardy, and golfer Mark O'Meara (reasons for this are discussed later in the chapter). Given such examples, it is clear that a closer look at what constitutes 'talent' is required.

Logically, if the aim of talent identification is to identify and recruit athletes who will go on to perform successfully at elite senior level, then any definition of talent needs to include some element of predictive validity. In fact, any definition that doesn't consider future potential is merely referring to current ability, be it either absolute or relative (e.g., a high level of ability when compared to others in the same age group). Accordingly, a more appropriate definition of talent in this context would be somebody who poses the potential to perform at a high level. Such a definition is reflected in the talent development literature (e.g., Williams & Reilly, 2000) and underpins the use of the word throughout this thesis, yet in its current state it yields little – if any – explicative power. What does potential look like? How do we know somebody has potential to be successful? What turns potential into ability? Furthermore, how do we define potential? Is there an objective measure for it, or is it purely based on opinion? If so, what makes one person's opinion more valid than another's? Trying to effectively identify future potential without overt indicators would, at best, be problematic and at worst, impossible. Given so many potential implications, considerations and

[1] I'll save you the trouble: Hotly tipped as a star of the future, footballer Robbie Cotton represented England at both Under 16 and Under 17 level, playing for Blackburn Rovers Under 21s as a 16-year-old. A subject of seven-figure transfer speculation, Robbie signed his first professional contract for Blackburn on his 17th birthday in 2011, made one appearance as an unused substitute against Queens Park Rangers, and has not been seen in full-time professional football since.

suppositions around just the word itself, it's hardly surprising that identifying and developing it effectively is a highly problematic task. Consequently, in a bid to provide both clarity and direction, an examination of the research around just how talent is developed (or how potential is converted into ability) is required.

2.3 Developing Talent

Research into the development of expertise has received significant attention in recent years, culminating, perhaps, in the presence of such popular science[2] books as Daniel Coyle's "The Talent Code", Matthew Syed's "Bounce" and Malcolm Gladwell's "Outliers" featuring in international bestsellers lists. Despite such research focus and obvious public appetite, however, there appears to be a lack of clear consensus across the literature as to how exactly talent develops, with researchers approaching the issue from different epistemological positions. As such, it is worth considering the key developmental models and frameworks in an attempt to identify key features and characteristics of effective talent development.

2.3.1 Modelling Talent Development

It is perhaps appropriate to start by examining probably the most famous (or, rather, now infamous, thanks to a previously mentioned popular bestseller!) model of development; that of deliberate practice. As one of the earlier examinations in to the development of expertise within chess, Simon and Chase (1973) observed that nobody had attained the level of international chess grandmaster with "less than about a decade's intense preparation within the game" (p.402). Further support for such an assertion was put forward by Krogius (1976), who found that the average time between

[2] With the emphasis most definitely on the "popular", rather than the "science".

chess players first learning the rules of the game and achieving grandmaster status was either 11.7 years or 16.5 years, depending upon them taking up the game either after or before the age of 11, respectively. Building on such evidence, Ericsson and colleagues (Ericsson et al., 1993) investigated the practice habits of classical violinists of differing standard, specifically looking to quantify the volume of practice undertaken and qualify its characteristics. They found that the key differentiator between exceptionally 'talented' violinists, the very good ones, and the merely good ones, was the amount of practice time accrued over long periods of time. In particular, they proposed a monotonic relationship between the amount of time an individual is engaged in what they termed "deliberate practice" and their acquired performance. Deliberate practice was qualified as a "highly structured activity, the explicit goal of which is to improve performance" (Ericsson et al., 1993, p. 368), requiring significant effort and not being inherently enjoyable. Furthermore, they stated that the maximisation of deliberate practice would extend over a period of at least 10 years, with the best violinists having reportedly practiced for in excess of 10,000 hours by the age of 20. However, despite common misconceptions, such a number of accumulated practice hours is neither a guarantee of success, nor a minimum requirement.

As the two most studied performance domains in expertise research, Hambrick and colleagues (Hambrick et al., 2014) examined a range of existing research conducted within both chess and music to determine the extent of influence of practice on performance. Their research found that, within chess, deliberate practice accounted for 34.0% of the total variance, whilst in music, deliberate practice only accounted for 29.9%. Moreover, Gobet and Campitelli's (2007) study identified chess players with estimated accumulated practice hours of over 10,000 hours, yet who remained intermediate-level players. Research into the role of deliberate practice in sport has also yielded conflicting results. For example, whilst Helsen et al. (1998) found support for a

monotonic relationship between performance and estimated training time in field sports, Bullock and colleagues (Bullock et al., 2009) were able to transfer an athlete from one sport – in this case surf-lifesaving – to the sport of skeleton bobsleigh, and take them from novice to Olympian with just 14 months of highly structured training. Given that these novice athletes were able to surpass those with "much more skeleton experience" (p. 403), they suggest that according to the theory of deliberate practice:

> …it would be impossible with less accumulated practice in a particular sport to fast-track or to perform at or above the level of individuals who started sport-specific deliberate practice earlier and maintained maximum levels of deliberate practice. (Bullock et al., 2009, p. 403)

Accordingly, while deliberate practice explains a considerable amount of the variance in these performance domains and is therefore a necessary requirement in the development of expertise, it is not in itself sufficient. This in turn raises the question, "So what else matters?"

In placing the emphasis so emphatically on the environmental aspects of talent development, the theory of deliberate practice assumes that any innate contribution to talent is negligible. If this were truly the case, it would follow that any programme of deliberate practice would yield consistent results across a population. However, in reality, this is far from the case. For example, as a core foundation of sporting performance, consider the impact of physical training. As part of the HERITAGE Family Study, investigation into training-induced gains in VO_2max ranged from almost 0% to 50%. This was despite all participants completing the same training programme, under close supervision with regulated compliance (Bouchard et al., 1999). Further studies have also reported such inter-individual variation in response to standardised training interventions (e.g., Hautala et al., 2006; Vollaard, Shearman, & Cooper, 2005). Such variation in response suggests an innate and individualised component to talent

development. Despite advocating development as an almost-entirely environmental process, Ericsson did concede the point that innate differences in height and body size will influence performance, particularly in sport (Ericsson, 2007; Ericsson, Prietula, & Cokely, 2007). Despite this, such innate differences do not adequately address the range of inter-individual variation to training described earlier (Ackerman, 2014). The *reason* differences in body size and height occur, however, may.

Following the mapping and publication of the human genome through the Human Genome Project (see Lander et al., 2001; Venter et al., 2001), humans were recognised to share over 99% of their DNA, yet the fraction of a percent we *don't* share accounts for the enormous diversity and variability between us (Baker, 2012). Not only does this variation explain our differences, but specific genetic variations may relate specifically to performance in sports. For example, the presence of the gene ACTN3 has been shown to have a beneficial effect on the function of skeletal muscle in generating forceful contractions at high velocity (Yang et al., 2003), whilst the gene ACE has been associated with improved cardio-vascular function, having obvious implications for endurance performance (Eynon et al., 2011). In fact, Williams and Folland (2008) identified 23 different genetic variants relating to superior endurance performance from existing literature, supporting the conclusion that genes do indeed influence performance. Additionally, however, they also calculated the chance of having all 23 genes was approximately 1 in 20 million. Moreover, in a study examining 46 world-class endurance athletes considering just 7 of the 23 previously identified genes, none of these world class athletes had all 7 genes as part of their genetic make-up (Ruiz et al., 2009). As Baker (2012) suggests, given the statistical probability of not only having the full complement of favourable genes, but also of that person also having been exposed to the right environment and training, it is highly unlikely that even world champion endurance athletes have the optimum set of genes. Consequently, it is highly

unlikely that the influence of genetics offers a parsimonious explanation for expert performance.

The genetic influence on talent is further complicated by the role of epigenetics. The recent emergence of the field of epigenetics has brought to the fore the role that the environment plays in mitigating genetic expression. Epigenetic processes control the expression (the phenotype) of the 'raw' DNA genotype but without altering it (Ehlert, Simon, & Moser, 2013; Sharp, 2008); conceptually – at least – acting as on / off switches for genes. These epigenomes are "likely to be susceptible to direct dietary effects along with effects due to external factors such as training" (Ehlert et al., 2013, p. 100), therefore potentially rubbishing the age old argument of nature versus nurture in favour of a more interactionist approach; nature *and* nurture.

In his model, Simonton (1999) acknowledged the epigenetic nature of talent development brought about by such interaction. However, perhaps his most insightful contribution was in how he conceptualised talent. Simonton proposed a mathematical model of talent, whereby 'talent' was a product of its component parts. Despite the number of component parts being both hypothetical and arbitrary, in doing so he was able to address several key issues. Rather than having a summative model, whereby talent would equal the sum of its component parts, by making the model multiplicative, any component that has a 'score' of zero (i.e., it does not exist) results in zero talent. In a practical sense, this carries a great deal of face validity. For example, a batsman in cricket may be very technically proficient in his stroke play, yet if he is unable to read the flight of a ball accurately in competition, he will not be able to express that proficiency (and will likely be dismissed very quickly!). Likewise, a centre forward in football may be a highly accomplished striker of the ball, but if she is consistently unable to find herself in a position to receive the ball, she will not be able to shoot. However, the moment that component improves on its initial score of zero, a

multiplicative model will suddenly result in *some* talent being displayed. The footballer may get the opportunity to demonstrate her goal scoring ability after several failed attempts. The batsman will be able to, on occasion, demonstrate his technical proficiency.

Such components that inhibit the expression of talent are termed 'rate limiters', and carry considerable implications for talent development systems. Specifically, if a developing athlete is unable to demonstrate their talent due to the presence of a rate limiter (i.e., the absence of a component of talent), rather than discard them from the system, the rate limiter needs to be acknowledged and addressed. Similarly, just because one component of talent is impeding the overall expression of talent, this does not mean that other components of talent are not being developed. The concept of rate limiters temporarily mitigating the expression of talent underpins the non-linear nature of talent development, and offers a sound rationale to the apparent rapid rise of the professional athletes described earlier in the chapter. Such a model also suggests that to be talented, the full development of each component is not necessary. Indeed, the identification alone of each component would be a monumental task. Rather, Simonton's multiplicative model suggests that it is possible to have high levels of ability as long as each component is developed sufficiently (i.e., a beyond minimum threshold) so as to allow other components to excel. In short, you don't have to be excellent at everything, just good *enough* at everything, and excellent at *some* things; a principle supported by the recent emergence of 'super strengths' type interventions in sport psychology literature (e.g., Ludlam, Butt, Bawden, Lindsay, & Maynard, 2016).

Another influential, popular, yet potentially controversial model used to explain the development of expertise is that of complex adaptive systems, and in particular, dynamical systems theory. Having been used to study and explain such diverse phenomena as weather systems, animal collectives, and neurobiology, complexity

sciences provide a way of identifying emergent patterns from seemingly random component trajectories (Phillips et al., 2010). Accordingly, the concept of talent development has been repositioned as a complex and dynamic process in which behaviours emerge from a complex interaction of sub-systems such as psychological processes, motor abilities, and physiological characteristics (Abbott et al., 2005; Davids, Button, & Bennett, 2008; Renshaw et al., 2012).

Dynamical systems theory proposes that complex biological organisms adapt their behaviour to suit their environment through self-organisation; a process whereby modified behaviours are assembled in an emergent fashion, depending upon the constraints that surround them (Kelso, 1995). Within the developing athlete, the acquisition and development of functional performance solutions to external constraints is therefore dependent upon the intrinsic dynamics of the performer being matched to the external dynamics of the task (Corbetta & Vereijken, 1999; Kelso, 1995; Phillips et al., 2010). In short, the athlete uses the tools available to get the job done. These intrinsic dynamics are shaped by a wide range of influences, including past experiences, genetics, and prior knowledge, each interacting to shape performance (Davids, Araújo, Vilar, Renshaw, & Pinder, 2013; Davids et al., 2008; Renshaw et al., 2012). If the behavioural requirements of the task closely match the intrinsic dynamics of the athlete (i.e., the athlete has the appropriate 'tools'), the system will be able to negotiate the constraints successfully and with relative ease, with the system remaining in a stable state. However, should the external constraints be sufficiently demanding, the complex system will initially be unable to negotiate them, and is therefore deemed unstable. When faced with such periods of instability within the system, assuming the self-determination to overcome such constraints, self-organisation allows the athlete to modify their behaviour (finding new tools) and develop new performance solutions

(Davids, Araújo, Button, & Renshaw, 2007; Phillips et al., 2010), and it is at this point where development occurs.

By modelling talent development in this way, dynamical systems theory offers several key insights. First, it suggests development is a challenging process. In order to develop to a more efficient state, a complex system first needs to be destabilised by a constraint of sufficient magnitude. Second, in order to engage with and negotiate this constraint, there has to be a need to overcome the constraint in the first place. Phillips et al. (2010) propose that an athlete can be considered a deterministic organism, given their ability to display intentional, goal-directed behaviours. Such self-determination is vital to the process of facilitating behavioural change, as it provides the 'glue' that allows the athlete to 'stick' to the process of negotiating constraints. Simply providing an athlete with the best possible constraint-laden talent development environment will not *automatically* guarantee success; interaction must occur. Third, any resultant process of self-organisation is likely to result in a temporary dip in performance, as the athlete 'system' seeks to adapt and re-stabilise in a more efficient state. In line with Simonton's (1999) model, dynamical systems theory also allows for rate limiters, where under-developed sub-systems will hinder the emergence of modified behaviours, even when other sub-systems are still developing.

Other available frameworks of talent development also offer key considerations for effective talent development. For example, building upon the works of Bloom (1985) and Csikszentmihalyi, Rathunde, and Whalen (1993), who proposed different stages of development, Côté and colleagues (Côté, 1999; Côté, Baker, & Abernethy, 2003) proposed the Developmental Model of Sports Participation (DMSP), a three-stage model of development within sport, advocating deliberate play and late specialisation. Deliberate play was differentiated from deliberate practice as being child-led, with adapted and simplified rules, and providing instant gratification (Côté et al., 2003; Côté,

Baker, & Abernethy, 2007), and increased exposure to its relatively unstructured nature at a young age has been shown to contribute to effective development (Ford, Ward, Hodges, & Williams, 2009). Similarly, late specialisation in structured sport participation is theorised to improve the opportunity to develop a broader base of functional movement solutions through exposure to a wider range of challenges and the subsequent development of appropriate movement patterns (Baker, 2003; Davids, Glazier, Araújo, & Bartlett, 2003). Given that in order to reach elite level, an athlete must go through each of the phases of the DMSP, the transitions between each phase (along with the smaller ones within it) must be successfully negotiated. As a potentially stressful yet crucial stage of development, the successful negotiation of these transitions is dependent upon the athletes' ability to cope in such situations (Abbott et al., 2005).

2.3.2 Key Features of Effective Talent Development

On examination of these models of talent development, it becomes apparent that key characteristics and features emerge, regardless of any epistemological differences. These characteristics could therefore be considered to underpin effective development, and as such, warrant special attention.

2.3.2.1 Duration. Irrespective of the exact amount of time required, the achievement of expertise takes a *long* time. Despite there being no overt evidence to support the so-called 10,000 hour rule (Ericsson, 2013; Tucker & Collins, 2012), even studies such as those by Bullock et al. (2009) demonstrate that expert performance requires many years of development, as they recruited athletes with an already established high-performing physiological state developed within other sports. The significant investment of an athlete's time (along with that of their parents and coaches) consequently requires there to be a need to engage in activities facilitative of

development. As such, characteristics that enable an athlete to persevere for a long period of time will be facilitative of effective talent development.

2.3.2.2 Challenge. Aside from the quantity of time spent training and developing, the quality of the activity is also crucial. The theory of deliberate practice describes engagement with challenging tasks as a prerequisite to the development of expertise (Deakin & Cobley, 2003; Ericsson et al., 1993). Similarly, dynamical systems theory proposes that in order for development to occur, constraints (i.e., challenge) must be sufficient enough to destabilise a complex system, yet not so extreme as to inhibit future adaptation (Corbetta & Vereijken, 1999; Davids et al., 2008; Phillips et al., 2010). Furthermore, as the nature of the adaptation is dependent upon the type of constraint placed upon the system (Davids et al., 2007), challenge needs to be targeted appropriately. Once more, given the often-arduous nature of the challenge inherent in talent development, characteristics that facilitate this prolonged engagement with challenge are a feature of effective development.

To illustrate this requirement for challenge, consider the everyday activity of driving a car. Between the commuting, the school runs, the shopping trips, and the family visits (not to mention 'mum and dad's taxi service'!), we accrue hours of driving experience every week, resulting in hundreds of hours each year. At ten hours a week, it would take 20 years to reach somewhere in the region of 10,000 hours, and as someone who has held their license for twenty years, I can say with some certainty: I'm no expert. But it is of no real surprise that we are not a nation of Lewis Hamiltons; driving is just something we 'do'. There's very little thought required, much beyond passing our driving test or attending driver awareness courses, as there's very little need for it; there's no challenge, only repetition. However, should we ever be challenged with driving around a race course as fast as we possibly could, it would be reasonable to expect that ten hours per week would yield some pretty significant improvements.

2.3.2.3 Complex interaction. Ubiquitous to talent development is the role of interaction between the athlete and their environment, be it a feature of deliberate practice, dynamical systems theory or epigenetics. However, an issue not captured adequately by deliberate practice theory is the complexity of the human system, especially in its response to challenge, and the vast array of other issues at play at any given point. Considering the unique nature of each athlete physiologically, biomechanically, psychologically and socially, each individual will react to developmental interaction in their own unique way (Abbott et al., 2005). This same level of complexity will also result in non-linear responses to challenge (Renshaw et al., 2012). Accordingly, any considerations relating to talent development must acknowledge the complexity, individuality, and non-linearity of this interactive process.

2.3.2.4 Post-challenge optimisation. In order for development to occur, there has to be a period of re-organisation and optimisation following an interaction with developmental challenge. In the context of dynamical systems theory, this is a process of self-organisation that allows functional behaviours to emerge over time, drawing upon the intrinsic dynamics available (Phillips et al., 2010). From a cognitive perspective, however, behaviours would be refined following an active process of consideration and reflection (e.g., Richards, Mascarenhas, & Collins, 2009). It is also worth considering at this point that while traditionally dynamical systems theory does not recognise the role of cognition in emergent behaviour (cf. Kelso, 1995), in reality, cognitive processes are *part* of an athlete's intrinsic dynamics and are deployed accordingly. Consequently, cognitive skills form part of an athlete's resources with which to negotiate challenge and facilitate such a period of post-challenge re-organisation.

2.4 The Talent Development Environment

When considering such key features of effective talent development, it is perhaps pertinent to consider the environment in which they occur. In fact, talent development environments are recognised as essential for success, given the way in which they can shape, challenge and support developing athletes (Gould, Dieffenbach, & Moffett, 2002; Larsen, Alfermann, Henriksen, & Christensen, 2013; Martindale et al., 2010). While context-specific differences will undoubtedly exist across different talent development domains (Martindale et al., 2010), existing literature has identified a range of key holistic and generic features of effective talent development environments (e.g., Abbott & Collins, 2004; Henriksen, Stambulova, & Roessler, 2011; Martindale et al., 2005). For example, in their investigation into successful talent development environments in football, Larsen and colleagues identified several features likely to explain the environment's success in developing talented athletes. These included supportive training groups, proximal role models, a focus on long-term development, strong and coherent organisational culture, support for the development of psychosocial skills, and integrations of efforts (Larsen et al., 2013).

Comparably, Martindale and colleagues (Martindale, Collins, & Abraham, 2007; Martindale et al., 2005; Martindale et al., 2010) found that successful environments were characterised by clear and consistent long-term philosophies, objectives, and methods; wide-ranging and coherent messages and support; clear links to both senior elite level and outside influences and stakeholders (e.g., parents, schools, etc.); systems that facilitate the promotion of player development with a focus on developing ownership, autonomy, motivation and goal-setting skills; and finally, an emphasis on age-appropriate development rather than age group success. Furthermore, in their study of a poor performing talent development environment in golf, Henriksen, Larsen, and

Christensen (2014) found a lack of supportive training groups and role models, short term focus, and an incoherent organisational culture.

Having acknowledged the more generic features of effective talent development environments, it is worth considering a more specific aspect in relation to the remainder of this thesis, namely that of team sports such as rugby (union and league) and football. Unlike individual sports, where the athlete is solely responsible for their own performance, athletes participating in team sports are required to work as a unit to achieve competitive goals (i.e., winning games). However, despite the need for supportive training groups (Larsen et al., 2013), individuals within these groups are required to stand out from their peers, fighting for social status, the respect of the coaches, and perhaps most pertinently, the limited squad places and contracts available for next season (Cushion & Jones, 2006; Taylor & Bruner, 2012). Accordingly, recognising the inherent features described in this section, talent development environments can be seen to provide areas of both challenge and support for the developing athlete.

2.5 Getting Better at Getting Better: The Importance of Psychology

Having identified what can be considered key features of effective talent development (i.e., drive, challenge, complexity, and optimisation), and the typical characteristics of the environments in which it is developed, it is perhaps at this point worth revisiting our earlier attempt at defining talent. Given that a talented individual can be viewed as someone who possesses the potential to perform at a high level, then possession of the skills required to negotiate the pathway and its inherent features are the key to actualising that potential and turning it in to a reality. Accordingly, a range of studies have highlighted the influential role psychological characteristics and their resultant behaviours play in facilitating the development of talent (e.g., Höner &

Feichtinger, 2016; MacNamara, Button, & Collins, 2010a, 2010b; Morris, 2000; Vaeyens et al., 2008; van Yperen, 2009). So, what are those skills; the key determinants of talent? Are some more important than others, and how can we develop and improve them? In short, how can we get better at getting better?

2.5.1 Persistence-Type Behaviours

Having established that development is an interactive process of engaging with challenge, it becomes apparent that failure to interact will stall progression. Consequently, there is a need for some form of 'glue' that will allow the athlete to 'stick' to the inherently arduous process of development. Without such a glue, the inherent difficulty and lack of enjoyment often associated with developmental practices would likely lead to failure to engage with the challenge for prolonged periods of time. The importance of this 'glue' is supported by the array of sports psychology literature that focusses on persistence-type behaviours and constructs, such as various forms of motivation, grit, resilience, and passion.

Over the last several decades, the motivation to endure challenge has been the subject of much attention. Atkinson and colleagues (Atkinson, 1957; McClelland, Atkinson, Clark, & Lowell, 1953) identified the role of achievement in directing such motivation, and since then, achievement motivation and the need to achieve has been the focus of a significant body of research incorporating a range of different constructs such as motive dispositions, attributions, evaluation anxiety, goals, values, and implicit theories (Elliot & Dweck, 2005). However, despite such popularity, achievement motivation theory has been criticised for a lack of both coherence and structural parameters, due to a failure to clearly define what constitutes achievement (Elliot, McGregor, & Thrash, 2002). In its place, Elliot and Dweck (2005) propose competence as the key motivational driver. Defined as "a condition or quality of effectiveness,

ability, sufficiency, or success" (Elliot & Dweck, 2005, p. 5), competence offers a framework through which achievement motivation can be better operationalised.

As an inherent psychological need (Elliot et al., 2002; Ryan & Deci, 2000), the need for competence can be seen as a fundamental motivational disposition that instigates and activates adaptive behaviours that are oriented towards competence. In line with achievement goal theory, competence motivation differentiates between mastery and performance goals (cf. Ames & Archer, 1987), with perceived competence as a critical moderator of achievement goal effects (Elliot & Harackiewicz, 1994, 1996). Mastery goals are expected to have a uniform effect across differing levels of perceived competence. Similarly, for those with high perceived competence, performance goals are likely to lead to mastery patterns. However, for those with low perceived competence, performance goals are expected to produce a level of helplessness such as effort withdrawal, avoidance, and decreased task enjoyment (Bartels & Magun-Jackson, 2009; Elliot & Harackiewicz, 1996). In the context of developing talent and expertise, these 'performance-avoidance' goals are likely to be detrimental to the development process, as individuals seek to adopt strategies that avoid negative possibilities in competence-relevant settings, and compromising developmental interaction. Despite offering some form of self-protection, such aversive forms of motivation are unlikely to provide the athlete with the positive competence outcomes and experiences required for continued growth and development (Elliot & Dweck, 2005).

As a construct often associated with perseverance and persistence through adversity, resilience research has received significant attention recently. Despite the construct being presented and operationalised in a variety of ways, most definitions are based around the two core concepts of adversity and positive adaptation (Fletcher & Sarkar, 2013). For example, Luthar, Cicchetti, and Becker (2000) define resilience as "a dynamic process encompassing positive adaptation within the context of significant

adversity" (p. 543), whilst Fletcher and Sarkar (2012) conceptualise it as the interactive influence of psychological characteristics within the context of the stress process. Accordingly, they then go on to define it as "the role of mental processes and behaviour in promoting personal assets and protecting an individual from the potential negative affect of stressors" (p. 675).

Conceptually, debate has emerged from the literature as to whether resilience is either a trait or a process (see Windle, 2011). As a trait, resilience can be seen as a range of characteristics that enable an individual to adapt to the circumstances they encounter (e.g., Connor & Davidson, 2003) and, as such, will remain relatively stable over time. Conversely, the conceptualisation of resilience as a process recognises that the effects of the protective and promotive factors will vary both contextually and temporally (Fletcher & Sarkar, 2013). However, given that resilience is dependent upon the adoption and deployment of mental processes and behaviours such as metacognition, focus and self-awareness (Fletcher & Sarkar, 2012), and that a lack of such processes – or indeed the inappropriate deployment of such – could in turn lead to failure to adapt positively to stressors, resilience may be better conceptualised as an outcome, driven by a series of underpinning processes. Indeed, the presence of resilience within an individual could only truly be determined post-stressor, once positive adaptation and protection can be accurately determined. As such retrospective assessment severely impacts the utility of the resilience construct, Sarkar and Fletcher (2014) identified a range of protective factors that, when actively promoted and developed, would increase the likelihood of an athlete's positive adaptation when exposed to stressors. The key psychological protective factors included: motivation, focus, perceived social support, confidence, positive personality and metacognition. Accordingly, these underpinning processes warrant close attention in the pursuit of more effective talent development.

Reflecting the work on resilience and the need for challenge, adversity-related growth is an area that has received significant attention recently. In their qualitative study with Olympic champions, Sarkar, Fletcher, and Brown (2015) suggested that participants encountered a range of sporting and non-sporting adversities that they attributed to their Olympic success, noting a period of growth following the initial adversity. Additionally, Savage, Collins, and Cruickshank (2016) also noted 'rebounds' in potential and progression following adverse experiences. However, there has been much "chicken and egg"-type debate around the mechanisms that likely cause this growth. For example, according to Tedeschi and Calhoun (2004), the process of post-traumatic growth is initiated by a major life crisis that challenges an individual's understanding of the world sufficiently enough to require them to reconfigure their shattered belief systems and schemas. Such a conceptualisation has been adopted in sport, with traumatic life events away from sport having been suggested as causative of athletic success (e.g., Howells & Fletcher, 2015; Rees et al., 2016; Sarkar et al., 2015).

However, rather than talent being *caused* by trauma, other studies propose that talent *needs* trauma[3]. In line with the principles of developmental challenge discussed previously, Collins and MacNamara (2012) suggest that small traumas or challenges can act as preparation for bigger developmental traumas and transitions through the development of "more functional approaches to challenge as [the individual's] preferred behaviour, so long as that approach matches the challenge" (p. 4). Furthermore, in their exploration of traumas in the development of talent, Savage et al. (2016) found that almost all reported traumas were sport related, and resulted not in the development of

[3] To aid clarity, in this context, the use of the word "trauma" refers to a challenge perceived by a performer to disrupt their development, in line with its use in other research (e.g., Collins & MacNamara, 2012; Savage, et al., 2016). It can therefore be used interchangeably with "challenge" in the context of this thesis.

new beliefs or skills, but in the redeployment and / or refinement of existing ones (e.g., increased level of focus). These existing skills and characteristics included motivation, self-belief, focus, self-awareness utilising social support, and learning factors (Savage et al., 2016). Given the stark similarity to those protective factors described by Sarkar and Fletcher (2014), it becomes apparent that such cognitive skills do indeed underpin the development of resilience, and that it is, essentially, an outcome rather than a process.

Grit, defined as "perseverance and passion for long term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087) is another emerging persistence-type construct associated with the development of talent and expertise across a range of performance domains. Grit theory proposes that the achievement of difficult goals and tasks is determined not only by "talent", but also by a sustained and focussed application of that talent over a long period of time (Duckworth et al., 2007). Through the development of an eight item questionnaire (see Duckworth & Quinn, 2009), "grittier" individuals have been shown to attain higher academic grades, outperform "less-gritty" peers in spelling bee competitions, be less likely to drop out of military cadet training and most pertinently for this context, spend more time engaged in sport-specific activities (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011; Duckworth et al., 2007; Duckworth & Seligman, 2005; Larkin, O'Connor, & Williams, 2015). It therefore becomes apparent that as a construct amenable to intervention (Duckworth & Gross, 2014; Duckworth et al., 2011), the development of grit in young athletes would appear to address the issue of negotiating challenge for prolonged periods of time as part of the process of talent development. Indeed, grit has been explicitly linked to success in spelling bees through the mechanism of deliberate practice (Duckworth et al., 2011). However, grit is not without its detractors.

For example, in their meta-analysis of grit research, Credé, Tynan, and Harms (2016) identified several key issues with grit, both conceptually and empirically. As a

construct, grit is typically presented as a higher order construct with two lower order facets, namely perseverance of effort and consistency of interest. Duckworth et al. (2007) states that, of these two facets, "neither factor was consistently more predictive of outcomes than the other, and in most cases, the two together were more predictive than either alone" (p. 1091). Yet, following their analyses, Credé et al. (2016) reported that the evidence did not support this. Rather, the data suggested that perseverance was a much better predictor of performance than either consistency or overall grit, and "should therefore probably be treated as a construct that is largely distinct from consistency to maximise its utility" (Credé et al., 2016, p. 11). Furthermore, Credé and colleagues also report that, in the context of academic performance, the explicative power of overall grit does not compare favourably with that of cognitive ability (cf. Sackett et al., 2012) or self-control (Duckworth & Gross, 2014; Duckworth, Tsukayama, & Kirby, 2013; Tangney, Baumeister, & Boone, 2004). Additionally, grit was shown to be very highly correlated to conscientiousness – one of the Big Five personality traits (see Goldberg, 1990) – to the point where grit may actually be viewed as a facet of conscientiousness (Rimfeld, Kovas, Dale, & Plomin, 2016). Consequently, as a construct, grit may actually be a case of "old wine in new bottles" (Credé et al., 2016, p. 4).

2.5.2 Deployment of Cognitive Skills and Strategies

In line with the key characteristics of talent development outlined earlier in the chapter, enduring challenge for a prolonged period is not in itself enough to facilitate development. Rather, there needs to be an adaptive response to challenge in order for improvement to occur. Given this need, the appropriate deployment of cognitive skills and strategies is crucial in maximising the efficacy of adaptive responses (e.g., van Yperen, 2009). To illustrate this, let us consider the construct self-regulation.

Self-regulation refers to the exercising of control over oneself, especially with regard to bringing the self into line with a preferred – and therefore regular – standard (Vohs & Baumeister, 2004). Self-control can also be viewed as an effortful form of self-regulation, and is defined as an ability to adapt one's responses to achieve a desired state or outcome that would otherwise not occur naturally (Baumeister, Vohs, & Tice, 2007; Tangney et al., 2004; Toering & Jordet, 2015). The development and deployment of self-regulatory strategies such as self-control and metacognition can allow an individual to better control their thoughts, behaviours and emotions, allowing them to adapt to their social and physical environment in a positive regard (Bartels & Magun-Jackson, 2009; Toering, Elferink-Gemser, Jordet, & Visscher, 2009). Accordingly, self-regulation and self-control have been shown to differentiate between those who successfully transition to elite level and those who don't in a variety of performance domains (Tangney et al., 2004; Toering et al., 2011; Toering et al., 2009; Toering & Jordet, 2015).

Drawing on the work of Orlick around the development of mental skills (e.g., Kreiner-Phillips & Orlick, 1993; Orlick, 2008; Orlick & Partington, 1988), and reflecting findings within elite-level sport (Gould et al., 2002), Abbott and Collins (2004) (and later MacNamara and colleagues) identified and developed a range of psychological characteristics that underpinned effective development . Termed Psychological Characteristics of Developing Excellence (Abbott, Collins, Sowerby, & Martindale, 2007; MacNamara, 2011; MacNamara et al., 2010a, 2010b), these psycho-behavioural characteristics (summarised in Table 2-1) consist of a range of both trait characteristics (i.e., the tendency to…) and state-deployed skills (i.e., the ability to…when…), and underpin the athlete's capacity to make the most of their own abilities (MacNamara & Collins, 2015).

Table 2-1. Summary of PCDEs (adapted from MacNamara, 2011)

Psychological Characteristic of Developing Excellence	Example Behaviours
Commitment	Arrives early to training Resilient when faced with obstacles and setbacks Shows consistent effort and good preparation
Focus and distraction control	Stays calm under pressure Blocks out distractions Displays consistent pre-performance routines
Imagery	Uses imagery to learn new skills Uses imagery to cope with negative emotion Uses imagery as part of a pre-performance routine
Realistic performance evaluation	Realistic evaluation regardless of outcome (win/loss) Attributes success and failure appropriately Identifies strengths and weaknesses correctly
Quality practice	Evaluates own progression in training Clarifies understanding in training Shows an understanding of why they do what they do
Goal setting	Independently sets goals for training and competition Reinforces achievements Sets appropriate goals
Coping with pressure	Responds positively to competitive situations Shows confidence to thrive under pressure Reacts appropriately to mistakes and criticism
Planning and self-organisation	Arrives early for training and matches Is appropriately prepared for training and competition Balances lifestyle commitments effectively
Self-awareness	Is aware of own current limitations Is aware of own strengths Has a good understanding of own emotions

Generic in nature, PCDEs have been shown to play a fundamental role in the development of talent and the realisation of elite performance across a range of performance domains, including sport, music, dance, and business (Ericsson, 1996;

Jones, 2002; MacNamara, 2011; Orlick & Partington, 1988). However, given the contextual differences between and indeed within each domain (e.g., differences between sports, age-group differences within the same sports, cultural differences between classical music and business, etc.), PCDEs will be operationalised and deployed differently depending upon an individual's age, stage, or challenge (MacNamara et al., 2010b; MacNamara & Collins, 2015). Given such variability, it is therefore imperative that the behaviours associated with the different PCDEs are clearly defined and understood by all involved. For example, a rugby player may be deemed by his coach to display high levels of commitment within the tackle, whilst his teammate may not. However, the teammate may have taken a two-hour bus journey straight from school to get to training, and may have to leave training fifteen minutes early in order to catch the last bus home. It could be argued that the second player is actually displaying greater commitment to his own development, but unless this is clearly defined from the outset (and assuming that the coach is aware), he could be seen to be far less committed, just wanting to leave early. As such, the fundamental consideration is that each PCDE must be defined and operationalised with the needs of the individual in mind, or that different 'manifestations' must be allowed for.

Once defined and operationalised, PCDEs need to be developed accordingly and in line with the individual's needs. Given the differential deployment of PCDEs across the developmental pathway, it is important to identify both the current levels of PCDEs within an athlete, along with the challenges they face, in order to best prepare the individual. Accordingly, MacNamara and colleagues developed and validated a 59-item questionnaire (PCDEQ; MacNamara & Collins, 2011; MacNamara & Collins, 2013) to formatively assess PCDEs and target effective interventions. Such a validated psychometric instrument offers great utility within a talent development setting, allowing coaches and support staff to target interventions with the aim of preparing the

athlete for upcoming challenges, such as transitions, injuries and competition. Such an approach complements that proposed by Martindale and colleagues, whereby these different psycho-behavioural characteristics are effectively structured within a talent development environment in order to optimise effectiveness (Martindale et al., 2005; Martindale et al., 2010).

2.6 The Next Step

Having reviewed the key features and requirements that underpin effective talent development, it becomes clear that these features are moderated by the psycho-behavioural characteristics of the individual. Accordingly, the development and appropriate deployment of these characteristics is crucial to the negotiation of the talent pathway and its rocky road (see Collins & MacNamara, 2012). Given our earlier definition of talent in the context of the realisation of potential, it follows that such psycho-behavioural attributes are, in essence, the building blocks of talent. Therefore, if we can develop these characteristics, we can provide athletes with the skills and attributes to persist through challenge and adapt positively; ultimately, we can get better at getting better.

With a view to improving the effectiveness of talent development processes, and having identified the potentially crucial role which psychology plays in realising potential, the following chapters seek to examine the different facets of psychological skills and characteristics that influence the efficacy of talent development, why they matter, and how they can be influenced. The remainder of the thesis seeks to address the more practical side; namely can we measure what matters? By being able to measure these different characteristics, evidence-based interventions can then be deployed where appropriate in a bid to improve effectiveness (the rationale for this is

discussed in more depth in Chapter 6). So with this in mind, let's start by addressing the first part of the question underpinning this thesis: *what matters?*

3. EXAMINING KEY DETERMINANTS OF TALENT DEVELOPMENT WITHIN AN APPLIED SETTING

3.1 Introduction

Having established in the previous chapter the importance of psychological characteristics in underpinning the talent development process from a theoretical perspective, the next logical step is to identify which characteristics influence development in an applied setting. Previous research has already empirically identified a range of adaptive constructs present in applied settings, namely PCDEs (MacNamara et al., 2010a, 2010b), grit (Duckworth et al., 2011; Duckworth et al., 2007), resilience (Fletcher & Sarkar, 2012; Sarkar et al., 2015), and self-regulation (Toering et al., 2009; Toering & Jordet, 2015; Toering, Jordet, & Ripegutu, 2013). However, given the significant impact that these constructs and their associated behaviours have upon development, and considering the mechanisms of development itself, it is perhaps curious to note the relative dearth of research examining the psychological characteristics that may hinder or derail the talent development process.

Such an approach has been used to good effect within the field of business leadership and organisational psychology, whereby Hogan and colleagues identified a range of 'dark side' characteristics and attributes that were likely to contribute to the derailment of managerial talent (Hogan & Holland, 2003; Hogan & Hogan, 2001; Nelson & Hogan, 2009). Rather than being purely an absence of adaptive qualities, these "dysfunctional dispositions" (Nelson & Hogan, 2009, p. 10) have been associated with poor social and occupational performance (Hogan & Hogan, 2001), degrading whatever skills and competences may be initially present (Nelson & Hogan, 2009); as such, their impact needs to be mitigated. Adopting such an approach to talent

development may be of considerable merit, as failure to achieve elite sporting success may be as much a product of these dysfunctional dispositions as it might the absence of those positive characteristics already shown to be determinants of athletic success.

It may also be that an overabundance or inappropriate emphasis on positive characteristics of development may, in certain circumstances, act to limit rather than enhance progress (MacNamara & Collins, 2015). As such, the scope for the inappropriate and maladaptive application of seemingly adaptive constructs becomes apparent, and is therefore worthy of attention. For example, taking the PCDE of commitment to excess, "over-commitment" can be displayed as a series of attitudes, behaviours and emotions that characterise a person working harder than is formally required, often driven by a need for approval and recognition (Hetland, Saksvik, Albertsen, Berntsen, & Henriksen, 2012). Such an effort-reward imbalance (Siegrist, 2001) can be deemed a precursor to maladaptive forms of perfectionism (Flett & Hewitt, 2002, 2005); an issue associated with athlete burnout (Hetland et al., 2012; Zhang, Gan, & Cham, 2007). The role of perfectionism is sport is complex, as many sports – especially at elite level – require near-flawless performances to be deemed successful (Flett & Hewitt, 2005). Yet despite some dimensions of perfectionism contributing to positive outcomes (Hill, Hall, Appleton, & Kozub, 2008; Slaney, Rice, & Ashby, 2002), it is primarily recognised as a negative factor that contributes to maladaptive outcomes (Flett & Hewitt, 2002), leading to burnout (Gustafsson, Hassmén, & Hassmén, 2011; Raedeke, 1997), and potentially, the derailment of talent. Such a perfectionism paradox only serves to highlight the potential complexity faced by applied practitioners in dealing with such an issue.

As an integral component of grit, passion has also been demonstrated to have both adaptive and maladaptive consequences. Vallerand et al. (2003) proposed a dualistic model of passion; harmonious passion being a motivational force resulting in

the autonomous and willing engagement of activities, whilst obsessive passion – despite being a strong motivational force – controls the individual and drives them towards the activity (Gustafsson et al., 2011). Athletes harmoniously-passionately involved in their sport are more likely to experience positive affect than those who are obsessively-passionately engaged (Donahue, Rip, & Vallerand, 2009; Vallerand et al., 2003; Vallerand et al., 2006). Negative affect has been shown to be a predictor and symptom of burnout in elite athletes (Lemyre, Treasure, & Roberts, 2006), meaning athletes scoring high on obsessive passion may be more susceptible to burnout than their more harmoniously-passionate counterparts (Gustafsson et al., 2011; Lemyre, Roberts, & Stray-Gundersen, 2007).

As well as these dual-effect constructs, MacNamara and Collins (2015) also identified a range of issues that negatively impact upon an individual's progression in sport and on their psychosocial adjustment. These may manifest as behavioural disorders that can undermine sporting performance (Singer & Janelle, 1999) and impact upon the ability to respond to developmental challenges. For example, individuals high in fear of failure have been shown to adopt avoidance strategies such as self-handicapping (Elliot & Church, 2003; Rhodewalt & Vohs, 2005), whereby obstacles to performance are created or claimed in a bid to deflect any perceived lack of ability. Similarly, extreme shyness (cf. Baker & Horton, 2004) and social anxiety often result in avoidance strategies and inability to seek social support (Zeidner & Matthews, 2007).

As another potential area for talent derailment, clinical mental health issues such as depression and anxiety have also been demonstrated to have a potentially negative effect upon the development through the employment of avoidance strategies (Grant et al., 2013). Athletes are being increasingly seen as no less susceptible to mental illness than general populations (Markser, 2011), and this is reflected in the current high profile of mental health in elite sport. However, this is a particularly pertinent issue for talent

development, as half of all lifetime cases of mental illnesses are recognised to begin by the age of 14, and three quarters by the age of 24 (Kessler et al., 2005); thus coinciding with the age range of most talent development programmes. As such, the investigation of clinical issues and mental health as potential derailers should prove a fruitful line of enquiry, and is considered in detail in Chapter 4.

Accordingly, this study sought to address the following key research questions. First, what positive psycho-behavioural characteristics differentiate between successful and unsuccessful developing athletes? Second, is there support for the facilitative role of PCDEs in talent development? Third, how – and to what extent – do dual-effect characteristics influence talent development, and finally, what psycho-behavioural characteristics are detrimental to effective talent development?

3.2 Method

This study set out to investigate the range of psychological characteristics and associated behaviours that impact upon the talent development process both positively and negatively, through a series of cross-sectional, retrospective qualitative interviews. Despite the acknowledged limitations relating to truthfulness and self-report bias (Amis, 2005; Patton, 2002), this method has been widely adopted in sport psychology literature (e.g., Fletcher & Sarkar, 2012; Gould et al., 2002; MacNamara et al., 2010a; Martindale et al., 2007) , as a way of identifying phenomena and ordering the social world (Atkinson & Delamont, 2005; Côté, Salmela, Baria, & Russell, 1993). Recognising that realities occur in the form of multiple, intangible mental constructions that are socially and experientially based (Guba & Lincoln, 1994), and that human behaviour is not reduceable to fixed patterns (Silk, Andrews, & Mason, 2005), the research throughout this thesis is underpinned by a constructivism ontology and epistemology, thus rejecting the central tenet of positivism (i.e., that there is a single reality that can be objectively

measured). Accordingly, the methodology adopted in this study was both dialectical and interpretive (Guba & Lincoln, 1994).

3.2.1 Participants

A purposive, criterion-based sampling approach was adopted, whereby potential participants were identified based upon their coaching qualifications, experience, and role, in a bid to glean a high level of information-rich data. The sport of rugby union was selected for several key reasons: as a team sport, the number of athletes that pass through the system potentially offer a greater resource from which to draw; the academy structure within the sport facilitates extensive contact between coach and athlete on a regular, often daily basis; and as a high-profile achievement domain, rugby union academies have produced a succession of world class elite level players. Based on this reasoning, the academies of all 12 clubs within the Aviva Premiership (England's top-flight competition) were invited to take part in the study, with three clubs unable to participate due to prior commitments.

Semi-structured interviews were conducted with academy directors and head coaches (n = 15), all of whom played an active day-to-day role in the coaching and management of aspiring elite rugby union players. Such a number of participants draws parity with other such qualitative studies in this domain (e.g., Gould et al., 2002; MacNamara et al., 2010a; Sarkar et al., 2015), and were saturation not reached (see next section), this number would have been increased until this was achieved. Academy directors and coaches were sampled in a bid to draw upon their unique insights and understanding of the TD process in rugby union. Furthermore, the decision to use a coaching population as opposed to a player population provided several key advantages. First, by engaging coaches, despite the cross-sectional design of the study, participants were able to draw on several years' experience, thus creating a richer and larger pool of

data than would have been gained from sampling only current players. Furthermore, this extended timeframe afforded coaches the ability to determine those players who went on to achieve success, therefore facilitating the contrast of behaviours between successful and non-successful athletes. The ages of the coaches ranged from 26 to 63 years (M = 38.9 years, SD = 11.1 years), all with between 3 and 32 years' elite level coaching experience (M = 13.1 years, SD = 9.2 years). As a male professional sport, all participants in this study, along with the athletes they discussed, were male.

3.2.2 Procedure

Ethical approval was obtained from the University's institutional ethics committee prior to the commencement of the study (see Appendix A), with informed consent obtained from all participants and confidentiality assured. Rather than adopting a narrative or ethnographical approach to this qualitative study, where the onus is on the researcher to interpret events (Atkinson & Delamont, 2005; Silk et al., 2005), it was felt that – in line with the research philosophy detailed earlier – a more dialectical, discursive approach was warranted; thus recognising the role of social constructivism in the way individuals experience, interpret, and explain their environment (Burr, 2015; Guba & Lincoln, 1994). Accordingly, a semi-structured interview guide was developed, designed to explore the different psychological aspects that may facilitate or derail talent development processes, along with follow-up probes and prompts to elicit data in specific areas of interest (see Appendix B). Reflecting the findings within the literature discussed both in this chapter and the previous one, the interviews comprised of three distinct sections: positive (e.g., "How do these behaviours and characteristics differ from other athletes who have not gone on to be successful at elite level?"), dual-effect (e.g., "Can you describe examples of when athletes have taken positive characteristics to excess, or perhaps applied them inappropriately?") and negative

characteristics and behaviours (e.g., "What do you think are the psychological or behavioural factors that stop an athlete making the most of their ability?"). These *a priori* constructs were adopted in order to help guide the analysis process by providing a provisional understanding from which themes can emerge; thus adopting an abductive approach as opposed to purely inductive or deductive one (Ali & Birley, 1999; Atkinson & Delamont, 2005; Patton, 2002). Deductive analysis was also carried out to test support for the utilisation of PCDEs, using the framework generated by MacNamara and colleagues in their initial study (see MacNamara et al., 2010a). Interviews lasted between 67 and 93 minutes (M = 79.5 minutes, SD = 8.2 minutes), preceded by an introduction and briefing, and were conducted at the participants' respective talent development environments. The interviews were conducted by myself, having had previous experience in interviewing, qualitative methods, and talent development.

3.2.3 Data Analysis

Interviews were transcribed verbatim and returned for participant checking along with the researcher's interpretations to establish credibility (Amis, 2005), with one transcript being returned with minor alterations to aid clarity of the original meaning. Following the recommendations of Côté et al. (1993), a standard content analysis was undertaken, with meaning units created from raw data segments; these meaning units were then grouped into emergent categories. This process was repeated in order to generate higher-order themes until theoretical saturation was reached, whereby all new meaning units analysed fit into the existing coding structure (Patton, 2002; Strauss & Corbin, 1998). In recognition of the researcher's role as the primary data collection tool and therefore the scope for potential bias (Amis, 2005), an independent researcher experienced in both qualitative analysis and talent development was invited to critically analyse the emergent categories to ensure they reflected the participants' quotations,

thus aiding credibility, confirmability, and dependability. Where this resulted in disagreement between the researchers, interpretations were put forward until an agreed explanation was found. This process resulted in the amendment of three category labels that were felt to better represent their subsequent meaning units (e.g., "limiting effects of perfectionism" became "managing perfectionistic tendencies"), thus suggesting a high degree of congruence. A deductive analysis was also undertaken on the data segments, with the specific purpose of establishing further support for the application of PCDEs in talent development, utilising the framework established by MacNamara and colleagues (MacNamara, 2011; MacNamara et al., 2010a).

3.3 Results

The purpose of this study was to identify the range of psychological characteristics that impacted positively on talent development, those that had potentially both a positive and negative effect, and those that were deemed to be detrimental to development. As such, and reflecting the structure of the interview guide, this section is presented in three stages: positive psychological characteristics, dual-effect characteristics and negative psychological characteristics. An overview of the emergent themes is presented in Table 3-1, with the themes italicised within the text to aid clarity.

3.3.1 Positive Psychological Characteristics

Support for the application of a range of PCDEs by developing athletes who have since gone on to achieve success was pervasive throughout the data and across all participants. For example, *commitment* was described as being demonstrated in a wide variety of ways, including *discipline* (e.g., "…they [successful athletes] have been massively disciplined." (Coach 14)), *doing the extras* (e.g., "I would say it does come down to those who are prepared to do the extra are generally the ones who do succeed,

and that's across the board." (Coach 10)), *motivation and drive* (e.g., "I think the ones that really stand out are the ones who you can see completely pushing themselves to their limits even when there's no coaches or teammates around watching." (Coach 8)), a *positive work ethic*, and the athlete's ability to *sacrifice*. It was also recognised more generally in terms of overall commitment. For example, coach 9 described how:

> They've got to commit to developing themselves, because – we mentioned it earlier – you can be a passenger and you can do okay or you can take control and ask how can I do more, how can I be better, where can I find improvement? (Coach 9)

Planning and self-organisation[1] (e.g., arriving early and prepared for training sessions) were also deemed important in order to manage workloads and maximise developmental opportunity, whilst *quality practice* and *focus and distraction control* were identified by coaches as key characteristics that positively influenced developmental efficacy, as highlighted by coach 11:

> [Name of player]'s short term goals, he was very focussed on them. He knew exactly what he wanted to achieve in a particular session. If that meant he stayed out there for two hours, then he'd stay there for two hours, because he would keep going until he got it right. (Coach 11)

Resilience was also highlighted as both a key requirement and a differentiator between those who go on to achieve success and those that don't. It was seen as enabling individuals to cope with the challenging demands of the talent development environment and facilitating *perseverance* despite initial failures:

[1] In the cognitive sense, rather than a dynamical systems context.

> And that resilience is a massive thing and it shows itself within a training session when they just want to go again, and again, or in selection and they're not picked, but they'll still be there, they'll still be keen and enthusiastic. (Coach 9)

Realistic performance evaluation and high levels of *self-awareness* were perceived to be fundamental to effective development, as an accurate self-assessment of the athlete's own ability was seen as forming the basis of effective *goal setting* strategies. As part of formal review processes, coaches described the successful athletes as having a very small differential between their own perception of their ability and the coaches' view (e.g., "Their differential tends to be quite small and they tend be often be harder on themselves and probably put themselves down a little bit when they're marking themselves and scoring themselves in different areas." (Coach 8)). The coaches also noted that those successful athletes were often harsh in their assessments, but that this did not impact on their *confidence and self-belief* (e.g., "I think it doesn't seem to necessarily affect their overriding belief that they've still got something that other people haven't." (Coach 5)).

In line with the existing literature, s*elf-regulation* was viewed as a key strategy employed by successful athletes. Successful athletes reportedly demonstrated *independence and ownership* of their own development, taking responsibility for important decisions:

> We sat in interviews with these players and parents, and parents are driving a lot of the education side of it and the comfort side of it, because that's what they feel comfortable with, and the really good lads at some point will take ownership of it and say, actually, this is what I want to do, I understand the pitfalls, but this is what I want to do. (Coach 1)

These athletes were also *proactive* in terms of seeking out and engaging in further developmental opportunities and were regularly seen *asking questions* in order to

further their own knowledge, as highlighted by the example "You see a cycle of people who just keep asking questions, and those hard working ones, they'll always ask questions once they understand something, and then push you for how can I have improvement" (Coach 9). Such *self-regulation* was also evident in the way many of the PCDEs were deployed. Coach 6 highlights the difference in an applied setting between possessing certain characteristics and deploying them effectively:

> [Name of player] was a good example, I guess… when it came to reviewing his performances you had to sit him down and make him do it. It's not that he couldn't, he was actually quite good at analysing his own game, he just didn't like to do it unless he had to, whereas some of the other kids, especially the better ones, they were probably more eager to do it. (Coach 6)

Qualities associated with a *growth mindset* were widely recognised by the coaches in those athletes who then went on to achieve success, with *learning from mistakes, engaging with challenge* and *reacting positively to setbacks* such as de-selection all consistently demonstrated, as exemplified in the following scenario:

> [Name of player] he's on loan at a National 2 club, which he's not happy about. He thinks he should be playing Premiership, but his coping strategy is to look at what he can do better and put more effort in to it. When he's on the pitch and National 2, it's to put more work in than anyone else and be the best player on the field. (Coach 15)

As a fundamental component of *grit, passion, energy and enthusiasm* was widely acknowledged by the coaches as a quality of those athletes who go on to achieve success, with its potential to positively influence the opinion of coaches.

> So as I say, [Name of player] arrives at every first team session with energy and enthusiasm, the work rate, the right attitude, positivity and the coaches see that, so

> they immediately go he's a good kid, he's working hard – all those things. (Coach 15)

The remaining component – *perseverance* – was demonstrated throughout as both *commitment* and *resilience* behaviours, and was therefore classified as such within the analysis process. Other positive psychological characteristics reportedly exhibited by those athletes who then went on to achieve success included a high level of *developmental awareness* (i.e., knowing what is required in order to develop as a player), *consistency* in their positive behaviours and associating with the environment's *cultural identity*.

3.3.2 Dual-Effect Psychological Characteristics

Obsessive passion was identified as having a negative impact upon development and/or performance, whereby athletes displayed excessive behaviours seemingly driven by a need to improve, such as *over-analysing* techniques.

> [Name of player] would start thinking about techniques and stuff. If he missed a kick, he'd be thinking "well I fell off that to the right, my head was too far up" or whatever…. he needs to concentrate on the whole process but he goes in to the details. He'll focus so hard on getting that one bit right that he missed that he can forget another bit. (Coach 11)

Similarly, *over-commitment* was described, with a recognition amongst coaches that, if left unmanaged, it could be potentially detrimental to an athlete's development, with the athlete partaking in well-meaning but misguided developmental activities, as demonstrated by coaches 6 and 8:

> If we set him some physical targets to hit, he'll hit them, however he's going to get them and hit them, whereas for us, all we're doing is risking that he gets

injured, because if he's not doing it in the right way, he's that determined, he'll still get there because that's his characteristics. (Coach 6)

I think [Name of player] is a good example again, the S&C guy had to keep a really close rein on him because he just thought that more was better, and he would just do more and more on his days off.… he just felt that the more he did, the better he'd get. That's one of the downside to that type of intrinsic drive, you know? (Coach 8)

Echoing the sentiments of the previous dual-effect characteristics, the role of *perfectionism* was seen as having potentially detrimental aspects to both development and performance. *Managing perfectionism* in the environment was seen as fundamental to maintaining its adaptive effects and minimising any maladaptive consequences, rather than attempting to address the processes that drive perfectionistic tendencies. The potential impact of *perfectionism* on development is illustrated by coach 15:

A guy [Name of player] who's played for England on the wing, now at [Name of club], he's the first guy on the training field, he's the last guy off the training field, he'll pass for two hours off his right, two hours off his left, rear foot passing – he'll just rep it out and rep it out and rep it out. And actually the big thing he needs to work on is weight gain, but you can't get him off his feet so it becomes very difficult to do that.... So I think it is about getting to know the individual, and with [Name of player] we got it wrong early on because we didn't know his personality well enough. We said okay, left foot kicking, off you go. Then he's out there until it's dark, so we were like right, okay, we've got to change this. So being aware of that is critical. (Coach 15)

3.3.3 Negative Psychological Characteristics

One of the primary issues raised as a negative characteristic was the employment of *avoidance-based coping strategies* by those athletes who didn't go on to achieve elite level success in rugby union. Many of these athletes were reported to use *avoidance* strategies to avoid possible failure, with coach 8 highlighting the detrimental impact this can have on their development and progression:

> Their drive to avoid messing up is greater than their drive to say "I want to put myself forward" … they end up getting released from environments because they're trying not to fail because if they do something wrong it shows up, but then they're not putting themselves forward to do things. (Coach 8)

In response to failures and unsuccessfully negotiating challenge, the less successful athletes reportedly often sought to employ *external attribution* as a strategy to disassociate themselves with the recent or potential failure, both on and off the field, as demonstrated in Coach 13's example, "It's how they address that situation – "I'm injured, so my body fat's gone". There's the little excuses there and it's how they address it", or that of Coach 9:

> "How do you think it went?" "Well he left me [isolated on the pitch] so it was difficult for me to…" There's not really an acceptance of yeah, it happens, how do I improve it, let's move on. It's "He should have come up and pressed with me, but I thought I was okay". (Coach 9)

Similarly, *impression management* and *affirmation seeking* were also employed by those less successful athletes to detract from perceived failures and weaknesses, for example: "Some of the lads think 'yeah, I'll score myself harshly, 'cos that's what the coach wants to see'" (Coach 13).

A *lack of commitment* to their own development was observed by the coaches across those who failed to progress, manifesting itself in a variety of ways such as *amotivation* and *doing the minimum*:

> If I've just got to do this rugby session this week, if I'm just doing the session – I won't try and add to the session, I won't set myself the challenge to perform in front of these coaches or train with the first team players – I'm just going to get through it. But I'll develop because I'm getting through it. And there's that thought process and those players don't quite make the transition. (Coach 9)

Similarly, *inconsistency* was cited as being detrimental to an athlete's development, with coach 3 describing its impact on one athlete's fitness:

> So you get to [Name of player] who came in and he was really fat and overweight but worked really hard to start with, and then it was too hard to keep going so he gradually went back to his start point, really. (Coach 3)

In line with behaviours representing a *lack of commitment, behavioural incongruence* was recognised by coaches as prevalent in those athletes who didn't go on to achieve success, essentially 'talking the talk' but not 'walking the walk', with some athletes demonstrating an *inability to sacrifice*:

> All of them come with the goal of I want to play for England or I want to play for the Lions and there's not many of them that back that up with the behaviours that are required…. I've seen guys who are willing to compete in an environment where there's other people there, but they're not so willing to compete when it's just them. (Coach 8)

Throughout the interviews, coaches highlighted the apparent *lack of awareness* amongst the less successful athletes. A *lack of self-awareness* and *poor performance evaluation* were cited as having a detrimental impact on development, such as in the following example cited by coach 15:

> We've got a lad in our programme who's a talented kid but his perception of himself – he works hard and he does all the things well – but his perception of himself is not in line with actually where he is. His belief is that he should be

> playing for the first team, he should be doing this, and managing him in a loan club environment is very difficult. Managing him through his development becomes very difficult because he sees the standard of rugby he's playing as beneath him. Whereas what he's doing is not playing to that standard of rugby, so he's essentially beneath that. (Coach 15)

Athletes also demonstrated a *lack of developmental awareness* of both their own developmental pathway and in relation to other, more senior players, as demonstrated by coaches 2 and 8:

> In terms of strength and conditioning, we didn't need him to be where he wanted to be at 15 years of age. There was always a long term plan to get him to where he needed to get to, and he struggled with that massively, because he wanted to be fresh all the time so that he could demonstrate his rugby ability. (Coach 2)
>
> The one's that aren't quite at the same level, they're often not prepared to sacrifice because they can't work out in their head the link between doing something now and that delayed gratification again – they don't work out the link that doing something now will pay them back in their physical term. (Coach 8)

It was reported that these athletes who didn't go on to achieve were often unsuccessful at managing developmental transitions (unlike their more successful counterparts), often *failing to overcome challenge* both within their sport and away from it. Coaches cited *expectation and entitlement* and an *absence of developmental challenge* as mechanisms for this failure, whereby early success had been achieved with little effort (e.g., physical precocity) or stakeholders (e.g., parents, schools, etc.) having "given them everything" (Coach 4). This was further supported by coach 2:

> He's had smoke blown up his arse for a hell of a lot of time because he is a talented player, but every time you try and go "what about this?" you get the strop, the derailment in every session. (Coach 2)
>
> I could probably name five kids a year who come through who've been dominant in their age groups and they get to a place where they have some ability but when it starts getting tough and they can't run around it. (Coach 5)

A variety of *mental health issues* were identified as having a negative impact upon development, such as *depression*:

> …A bit like the [Name of player] issue in terms of looking for a way out. Home life issues which are causing issues here. We get quite complex home life situations which can create a lot of stress for the players while they're here. It ends up with depression and stuff like that. [Name of player] would be one of those, you'd say at various points he goes in to a big sort of depression, and it's very hard to learn how to deal with him. (Coach 1)

Eating disorders and in one extreme case, *suicidal tendencies* were also identified by the coaches. Whilst acknowledging their existence and potential negative impact on development, the coaches accepted that their knowledge of the subject was very limited, often referring athletes to appropriate specialists, as described by coach 8:

> We're working with a psychologist with it at the moment because [Name of player]'s very emotionally unstable around games, particularly after games, being tearful and crying after games, which has concerned me and I don't know what the root of that is. I'm trying to work out at the moment the best way around helping him and finding out what it is, working with our psychology guys trying to help him to do that better. (Coach 8)

The *prevalence and awareness* of *mental health issues* was also discussed. Despite coaches acknowledging the impact of mental health on developmental athletes, several

of them raised the question of its true extent within the sport due to a poor understanding and awareness, for example: “I think you could probably, with a little bit more education towards the guys in charge of the programme, identify those things far earlier.” (Coach 15). Despite this, several coaches noted an increased prevalence in mental health issues: “Whether it’s here or whether there’s an underlying issue prior to coming in to here, there’s definitely an increased prevalence of those sort of mental health issues.” (Coach 4)

Table 3-1. Psychological Characteristics Influencing Talent Development

Umbrella Themes	Higher-Order Themes	Sub-Themes
Positive Psychological Characteristics	Cognitive Ability	-
	Cultural Identity	-
	Effective Communication	-
	Game Understanding	-
	Honesty	-
	Leadership	-
	Maturity (non-physical)	-
	PCDE – Commitment	Competitiveness
		Consistency
		Discipline
		Doing the Extras
		Motivation & Drive
		Positive Work Ethic
		Sacrifice
	PCDE – Coping with Pressure	-
	PCDE – Focus & Distraction Control	-
	PCDE – Goal Setting	-
	PCDE – Planning & Self-Organisation	-
	PDCE – Quality Practice	Attention to Detail
		Engaging with Challenge
	PCDE – Realistic Performance Evaluation	Accepting Criticism & Advice
	PCDE – Resilience	Accepting Mistakes & Moving On
		Adapting to Change
		Learning from Mistakes

		Reacting Positively to Setbacks
	PCDE – Self-Awareness	Developmental Awareness
		Belief in Own Abilities
	Process Orientated	-
	Self-Regulation	Asking Questions
		Independence
		Ownership of Development
		Pro-active
Dual-Effect Psychological Characteristics	Aggression	-
	Passion	Positive Energy & Enthusiasm
		Obsession
	Over-Commitment	-
	Over-Confidence	-
	Perfectionism	Managing Perfectionistic Tendencies
		Driving Group Standards
	Pre-established Frameworks & Beliefs	-
	Work-Life Balance	Balanced Approach to Sport
		Managing the Balance
		Outside Interests
		Sole Focus on Sport
Negative Psychological Characteristics	Avoidance-based Coping Strategies	Avoidance
		External Attribution
		Impression Management
		Seeking Affirmation & Praise
		Social Excesses
	Complacency	-
	Expectation & Entitlement	Absence of Challenge

Failure to Overcome Challenge	Absence of Coping Mechanisms
Inappropriate Goals	-
Lack of Awareness	Lack of Developmental Awareness (
	Lack of Self-Awareness
	Poor Performance Evaluation
	Unrealistic Expectations
Lack of Commitment	Amotivation
	Behavioural Incongruence
	Doing the Minimum
	Inability to Sacrifice
	Inconsistency
Loss of Focus / Easily Distracted	-
Mental Health	Depression
	Eating Disorders
	Prevalence & Awareness
	Suicide or Suicidal Tendencies
Negative Attitude	-
Poor Communicators	-
Psychological Burnout	-
Self-Doubt	-
Self-Handicapping	-
Shyness	-

3.4 Discussion

The study identified wide-ranging support across the data for the application of PCDEs by successful athletes within rugby union academies, reflecting the findings of existing literature. In line with MacNamara and colleague's previous work (MacNamara, 2011; MacNamara et al., 2010a, 2010b), these PCDEs were recognised as being operationalised in a variety of ways by different individuals at different times. For example, several coaches discussed high levels of commitment, focus and attention to detail in developing athletes who went on to successfully graduate from their respective academies. However, Coach 15 described an example of one player who did not display these characteristics initially and as a result was released from the programme, but went on display them later on in his development:

> [Name of player] at [name of club] is a guy that was in the academy, was released because he was poor on his nutritional detail, poor on various things so they said we're not wasting any more time with you. Then they had to resign him for [fee] from [name of club] when he finally got himself in gear. (Coach 15)

Such a demonstration of non-linear development and the resultant premature de-/non-selection is an issue being increasingly recognised in academic literature (Abbott et al., 2005; Abbott & Collins, 2004; Bailey & Collins, 2013) – if not in practice – perhaps raising the issue of appropriate support systems within a talent development environment.

Of the PCDEs proposed in the literature, all were identified within the data as being prevalent within individuals who had gone on to achieve success, with the exception of imagery. Such an omission suggests that it was either not operationalised by the developing athletes at this stage, or alternatively that it was not recognised by the

coaches. Given that other studies have readily shown that mental imagery is a common feature of talent development in a range of sports (e.g., Driediger, Hall, & Callow, 2006; Foster, Maynard, Butt, & Hays, 2015; Gould et al., 2002; Martinent & Decret, 2015; Munroe-Chandler, Hall, Fishburne, & Strachan, 2007), the first scenario seems much less likely than the second. Considering the nature of the methodology used in this study, and that coaches have been asked to report on athlete behaviours and characteristics, it is perhaps unsurprising that imagery has not been identified, given the potential lack of overt and observable behaviours associated with such a primarily cognitive process. It is still an issue which merits close attention, however, especially given the potential power of imagery-related interventions and actions in enhancing progression and performance (Driediger et al., 2006; Orlick & Partington, 1988; Taylor & Shaw, 2002), and should not readily be dismissed as non-influential.

Self-regulated learning strategies are predictive of both superior athletic performance and enhanced motivation (Zimmerman & Kitsantas, 1996, 2007), and were widely recognised throughout the data in those athletes who went on to achieve success in their sport. This reflects Toering and colleagues' suggestion that self-regulation is important for youth athletes in order to maximise both developmental opportunity and their own potential (Toering et al., 2011; Toering et al., 2009; Toering et al., 2013). Self-promoted PCDEs such as goal setting, self-organisation, planning and performance evaluation are in themselves recognised self-regulatory learning strategies (Zimmerman, 2006; Zimmerman & Kitsantas, 2007), thus highlighting the importance of self-regulation in effective talent development. Conversely, an absence of independence and ownership – qualities also associated with effective self-regulation – were reported in those athletes who were unsuccessful in achieving their long-term goals, as was an absence of PCDEs, such as a lack of commitment or an inability to cope with pressure.

Characteristics associated with the growth mindset construct (Dweck, 2006) were a key feature of reports describing those athletes who went on to achieve success. Similarly, grit (Duckworth et al., 2007) was also prevalent. However, upon examining the descriptions of these effective behaviours, it becomes apparent that characteristics such as engaging with challenge, learning from mistakes, and reacting positively to setbacks are actually operationalised through the deployment of PCDEs and self-regulatory processes. For example, self-regulated learners have been shown to display persistence during learning (Zimmerman, 1990); realistic performance evaluation is fundamental to learning from mistakes as part of a reflective process; and the self-motivational beliefs associated with passion and engaging with challenge are also linked to self-regulation (Zimmerman, 2006). Consequently, PCDEs and self-regulation may offer a more parsimonious explanation to such behaviours.

A range of dual-effect characteristics were recognised in both successful and unsuccessful developing athletes. Coaches recognised the need for passion as a motivational force within athletes to help drive their development, acting as a metaphorical 'glue' that helps 'stick' the athlete to the development process. This in turn enables them to persevere with key developmental activities that may not themselves be inherently enjoyable (Ericsson et al., 1993). However, coaches also reported situations where this passion had been taken to excess. This manifested itself as instances where athletes focussed too much on a single aspect of their performance or development and lost focus on their overarching aims – the 'bigger picture'. Such behaviours suggest levels of obsessive passion; a product of a "controlled internalisation of the activity into one's identity" (Vallerand et al., 2003, p. 757) that results in a compulsion and/or pressure to engage in a specific activity, inflexible persistence, and increased negative affect. Conversely, harmonious passion is internalised autonomously, resulting in an individual choosing to engage with an activity they like.

Interestingly, despite the reported association between obsessive passion and injury burnout (Akehurst & Oliver, 2014; Quested & Duda, 2011), this was something that the coaches felt was not the case in their environments, with a range of safeguards, support and interventions applied when appropriate.

Such mitigation of the negative aspects of a dual effect characteristic was also evident in the cited cases of perfectionism, whereby perfectionistic tendencies within individuals were managed in a bid to mitigate any maladaptive effects. Within perfectionism literature, there is a common consensus that when the overlap for perfectionistic strivings and perfectionistic concerns is controlled for, perfectionistic strivings show positive correlations with adaptive characteristics, with the positive associations of perfectionistic strivings often supressed by the negative association of perfectionistic concerns (Gotwals, Stoeber, Dunn, & Stoll, 2012; Hill, Huelsman, & Araujo, 2010; Stoeber, 2011). If, however, as suggested, the way to increase the adaptive function of perfectionism is to reduce the level of perfectionistic concerns rather than increase the level of perfectionistic strivings (Stoeber & Janssen, 2011), yet both dimensions of perfectionism are significantly correlated (Dunkley, Zuroff, & Blankstein, 2003; Stoeber & Janssen, 2011), it therefore follows that the net effect of perfectionism would remain relatively unchanged. Given any lack of net benefit, and that a level of perfectionism is often desirable in many performance domains, there is perhaps merit to the coaches' approach of attempting to mitigate any negative consequences of an athlete's perfectionistic tendencies in an applied setting, rather than attempting to address the processes behind them.

A range of characteristics that were detrimental to the talent development process were reported by the coaches as identifiable in those athletes who did not go on to achieve success. Curiously, the most common responses to this section of the interview was not in fact a negative construct per se, but rather an absence of positive

behaviours and characteristics. In recognising that, for example, a lack of commitment or lack of developmental awareness within an athlete is likely to hinder development, coaches only served to highlight the need for the development of such positive constructs in order to improve the efficacy of their talent development processes.

Less successful athletes were described as employing a range of avoidance-based strategies, rather than deploying PCDEs or self-regulatory strategies, when faced with developmental challenge; reportedly in a bid to avoid potential failure[1]. However, adopting avoidance strategies can have big implications for talent development. As discussed in the previous chapter, one of the key fundamental principles of development is the need for the individual to engage with a targeted challenge, in order to facilitate any subsequent adaptation. The data highlights the consequence of employing such strategies, leading to either failure to engage effectively with developmental challenge and opportunity, or a reduced effectiveness of this interaction.

Recognised by coaches as a key issue detrimental to talent development, issues around mental health issues were raised as key concerns. The consequences of such issues included time away from the talent development environment for the athlete involved, and a reduced effectiveness of interaction with it when present. Coaches recognised the increased prevalence of mental health issues in rugby union, in part to its current raised profile in the media, but suggested a lack of awareness and limited provision for it at both a macro (i.e., systemic) and micro (i.e., coach-athlete relationship) level. Examples were cited whereby individuals were referred in the first instance to psychologists and doctors by the coach, in order to receive support for mental health issues. However, if – as was reported – these coaches (and potentially the

[1] At this point, due to the observational nature of the data, the likely motivation for such avoidance behaviours cannot as yet be accurately determined, but is discussed in subsequent chapters.

wider coaching system as a whole) have a poor awareness and understanding of the issues and symptoms associated with mental ill-health in young people, then diagnosis and referral of developing athletes to the appropriate support will likely be sub-optimal. Further research on the awareness and impact of mental health issues in a talent development setting is therefore necessary.

The role of motivation appears to underpin many of the characteristics and choices of adopted strategies in successful athletes as well as their less successful counterparts, such as its impact upon commitment levels (Ryan & Deci, 2000; Weiss, Weiss, & Amorose, 2010) and the associated behaviours. Coping strategies such as avoidance, external attribution and impression management are often associated with a fear of or need to avoid failure (Elliot & Church, 2003; Rhodewalt & Vohs, 2005; Schultheiss & Brunstein, 2007). Such behaviours are again likely to compromise the interaction with developmental challenge, and therefore require further examination. For example, within the context of talent development in sport, parents of aspiring athletes have been shown to contribute to the development of fear of failure through their high expectations, controlling behaviours and punitive measures (Sagar & Lavallee, 2010). It is therefore highly plausible that other significant stakeholders such as coaches – who are likely to hold similar powers – may also contribute through similar mechanisms. As such, the role of these external stakeholders and their long-term effect upon an athlete's motivational disposition warrants closer scrutiny.

3.5 Conclusion

This study sought to identify the range of psychological characteristics, attitudes and behaviours that impact upon the talent development process within the context of rugby union. In line with existing literature, a range of positive, negative, and dual effect characteristics were identified through a series of retrospective interviews with

elite academy coaches and directors. Specifically, considerable support was found for the role of PCDEs on improving the efficacy of talent development. However, given the scope and diversity of the different psychological attitudes and behaviours that have been demonstrated to impact both positively and negatively on the talent development process, the development of positive characteristics only serves to address part of the issue. Due attention must be given to how to effectively manage the dual effect and negative characteristics and behaviours identified here, as these will, inevitably, manifest for at least *some* of the athletes at *some* stage during their development. Consequently, the need for a formative assessment tool from which to base effective interventions is obvious. The existing Psychological Characteristics of Developing Excellence Questionnaire (PCDEQ; MacNamara & Collins, 2011), goes some way to addressing this by offering a comprehensive and validated assessment of many of the positive attributes required, but as this study shows, only assessing PCDEs ignores a broad range of characteristics and behaviours that also influence talent development efficacy.

Building upon the data presented in this chapter, subsequent chapters aim to address key issues arising from the study. First, given the acknowledged shortcomings in awareness and understanding of mental health and clinical issues, Chapter 4 seeks to examine the types of mental health issues faced by adolescents and developing athletes, issues around identification and factors relating to the effective management of mental health and wellbeing within a talent development environment. Second, Chapter 5 delves deeper into the operationalisation of dual effect constructs, in particular looking at the influence of fear of failure. Finally, Chapters 7 and 8 focus on the development and validation of a new, more comprehensive formative psychometric tool for assessing the positive, dual effect, and negative characteristics that influence talent development.

4. INVESTIGATING THE ROLE OF MENTAL HEALTH AND CLINICAL ISSUES WITHIN TALENT DEVELOPMENT

4.1 Introduction

Mental health issues in elite sport have received significant media attention of late, with athletes such as multiple Olympic swimming champion Ian Thorpe, Ashes winning cricketer Andrew Flintoff, and double Olympic gold medallist Dame Kelly Holmes all speaking publicly about their own personal battles with differing mental illnesses. Although there is a significant body of literature supporting the association between physical activity and mental health (e.g., Morgan, Parker, Alvarez-Jimenez, & Jorm, 2013), current research acknowledges that athletes are no less susceptible to mental illness than the general population (Bar & Markser, 2013; Markser, 2011). Despite this, there often lies the erroneous assumption that the mental toughness developed in and required for elite sport may offer a protective factor to elite athletes (cf. Mazzer & Rickwood, 2014). As Olympic medal-winning athlete Natasha Danvers highlights, promoting the need to be mentally tough, may in fact only serve to stigmatise mental weakness, making it harder to seek help:

> I've grown up in my sport with the impression I was meant to be a superhero. You're supposed to be able to handle things. You are in high pressure situations so you are convinced you should be able to handle those situations yourself, so it is hard to get help, it is admitting you have a weakness. (Mind, 2014)

The recent reporting of high profile mental health issues in sport has led to the development of a series of programmes designed to make an impact in performance

sport, such as the work undertaken by the organisation State of Mind, the Performance Matters programme by the mental health charity Mind, and by players' unions such as the Professional Cricketers Association. Such initiatives include education around behavioural indicators of potential clinical issues and improved signposting of referral programs within professional organisations, all aimed at providing elite athletes with appropriate support. However, despite these initiatives within sport being both necessary and welcome, there appears to be an underlying limitation to their effectiveness.

Given that membership of professional bodies and access to high performance support (e.g., such as that provided by national institutes for sport) usually requires athletes to have attained either professional status or have been awarded a position on a performance programme, what happens if the athlete requires support prior to this point? This is a particularly pertinent question when set against the findings of the previous chapter, with the coaches and academy directors highlighting the negative impact of mental health issues on young developing athletes. Evidently, mental health in sport isn't just the sole preserve of the elite and / or the recently retired, yet its impact upon talent development remains relatively unchartered territory.

In a wider context, within the United Kingdom, approximately 10% of children aged between 5 and 15 have a diagnosable mental disorder (Green, McGinnity, Meltzer, Ford, & Goodman, 2004), i.e., one that can be categorised according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-V; American Psychiatric Association, 2013). Furthermore, as mentioned in the previous chapter, half of all lifetime cases of mental illnesses are recognised to begin by the age of 14, and three-quarters by the age of 24 (Kessler et al., 2005). Given the importance of early intervention and effective treatment (Burns & Birrell, 2014), the age groups concerned, and the potentially devastating consequences of clinical issues going undiagnosed, the

implications for talent development systems starts to become obvious. Despite these concerns, however, there appears to be a dearth of research examining both the nature and impact of mental health issues in such a setting. More specifically, there appears to be a dearth of research involving genuine, clinical expertise. For effective understanding and advice on this highly sensitive issue, the inclusion of such expertise is of paramount importance.

A brief recap on Chapter 3 highlights reveals the types of mental health and clinical issues identified in the previous study, including anxiety, depression, eating disorders, perfectionistic behaviours and suicidal thoughts and feelings. Along with the obvious (and most important!) issue of the detrimental effect on an athlete's wellbeing, these issues also carry with them several negative implications for the talent development process itself. For example, research has shown that symptoms of anxiety and depression can predict avoidance-based coping behaviours within students (Bianchi, Schonfeld, & Laurent, 2015; Grant et al., 2013). Avoidance coping, defined as an attempt to "minimize, deny or otherwise circumvent managing specific stressors" (Grant et al., 2013, p. 879), is particularly detrimental to development, as it mitigates or even removes the interaction between the athlete and developmental challenge (see Chapter 2; see also Collins & MacNamara, 2012; Phillips et al., 2010). Furthermore, Grant et al. (2013) also demonstrated that the relationship between avoidance coping and anxiety and depression was reciprocal, suggesting that should an athlete consistently choose to deploy avoidance-coping behaviours to mitigate developmental challenge, then they are at an increased risk of developing depressive or anxious symptoms. Such a relationship could very easily lead to a vicious cycle of avoidance and anxiety and / or depression. Conversely, developmental challenge, though described as inherently stressful, has been shown to be a key driver of development by enabling young performers to develop and refine the psycho-behavioural skills (e.g.,

resilience) required to negotiate their pathway to excellence (McCarthy & Collins, 2014; Sarkar & Fletcher, 2014).

High levels of perfectionism, potentially maladaptive within sport and talent development (Flett & Hewitt, 2005; MacNamara & Collins, 2015; Stoeber, 2011), have also been observed as a precursor to major depression, anxiety disorders and also eating disorders (Sassaroli et al., 2008), with such influence tending to centre around evaluative concerns (DiBartolo, Li, & Frost, 2007). Along with this association with perfectionism (and its associated maladaptive traits), eating disorders such as anorexia nervosa and bulimia nervosa also bring with them other issues such as potential nutrient deficiency. This can subsequently compromise the physical adaptation to exercise, potentially initiating other cycles of underachievement, anxiety, and depression. Indeed, although often perceived as a predominantly female issue – perhaps in part to the female athlete triad (Nattiv et al., 2007) and the lack of a male equivalent (Thompson & Sherman, 2014) – both male and female athletes are recognised as being at risk of eating disorders and disordered eating (Baum, 2006; Thompson & Sherman, 2010).

Additionally, some sports carry a greater risk of eating disorder, such as aesthetic sports (e.g., gymnastics), sports where a low body fat percentage is beneficial (e.g., road cycling), weight-making sports (e.g., boxing) (Baum, 2006), and sports such as rugby where increased body mass is seen as advantageous (Till, Jones, McKenna, Whitaker, & Backhouse, 2015). As such, issues around body image and those relating to eating disorders are pervasive throughout sport (Kong & Harris, 2015). It may also be that the stage of development and age of the athlete represent even more important considerations than the sport itself. Indeed, Thompson and Sherman (2014) have identified young, developing athletes as a particularly high risk cohort, citing less available support, lower levels of awareness and being at a high-risk age (i.e.,

adolescence) as extra risk factors. Unfortunately, there is as yet relatively little evidence to support this assertion, and further research is warranted with this at-risk group.

So, despite coaches acknowledging the impact of mental health issues in talent development settings, and given that coaches are often the primary identification tool for such issues (Sherman, Thompson, DeHass, & Wilfert, 2005), it is somewhat alarming that these same coaches also report a distinct lack of understanding of clinical issues and mental health in sport (see Chapter 3). With this in mind, the purpose of this chapter was threefold. The first aim was to identify the range of mental health issues that may impact on such individuals, both as developing athletes and as adolescents, along with their potential consequences for the development process. The second aim was to identify the specific risk and protective factors that may be associated with, or incorporated into talent development environments. Finally, this study sought to identify current practices and procedures around identification of mental health issues within a TID setting, with a view to addressing potential inefficiencies.

4.2 Method

This study set out to investigate the range of clinical mental health issues that impact upon developing athletes and high achieving adolescents through a series of cross-sectional, retrospective interviews. Such an approach has been widely adopted throughout sport psychology literature (e.g., Côté, Ericsson, & Law, 2005; Gould et al., 2002; MacNamara et al., 2010a; Sarkar et al., 2015) as a way of identifying phenomena and eliciting high levels of information-rich data, whilst acknowledging limitations relating to truthfulness and self-report bias (Amis, 2005; Atkinson & Delamont, 2005; Patton, 2002). This approach falls in line with the ontological and epistemological stance adopted throughout this thesis, as detailed in Chapter 3.

4.2.1 Participants

A purposive, criterion-based sampling approach was adopted, with potential participants identified based on their clinical qualifications, roles, and experience of working with developing adolescents. Semi-structured interviews were conducted with clinicians specialising in children and young people and/or athletes (n = 8; 2 male, 6 female), in a bid to draw on their unique understanding of issues that may impact upon developing athletes and high achieving adolescents. The participants' experience ranged from 13 to 31 years of providing clinical support (M = 20.2 years, SD = 7.91), with all participants experienced in working with adolescents, and six participants experienced in both sport and adolescent environments. The decision to include two non-sport experienced clinicians was taken in recognition of the fact developing athletes are young people first, and athletes second. By including participants form outside of sport, issues that stem from outside of a talent development setting but that may impact upon the development process (or on the athlete more generally) may be identified and better understood. Furthermore, the total number of participants in the study is comparable with other studies of a similar nature (e.g., Mazzer & Rickwood, 2014; Plateau, McDermott, Arcelus, & Meyer, 2014), and were saturation not possible, further participants would have been sought.

4.2.2 Procedure

Ethical approval was obtained from the University's institutional ethics committee prior to the commencement of the study (see Appendix C), with informed consent obtained from all participants and with confidentiality assured. A semi-structured interview guide was developed (see Appendix D), designed to explore the different types of clinical issues experienced and their consequences, along with follow-up probes and prompts to elicit data in specific areas of interest. Topics addressed

included the types of issues and their impact (e.g., “Based on your experience, can you describe the types of issues that have been presented in developing athletes?”), the role of the environment (e.g., “What protective factors do they offer?”), and issues surrounding identification and assessment (e.g., “What observable behaviours might give you cause for concern in a developing athlete?”). Interviews lasted between 45 and 76 minutes, (M = 60.3 minutes, SD = 11.01 minutes), preceded by a briefing and an introduction, and were conducted at locations chosen by the participants.

4.2.3 Data Analysis

Interviews were transcribed verbatim, with the researcher’s notes, questions and annotations regarding possible misinterpretations added. These were then returned for participant checking, allowing the participants opportunity to clarify meanings in a bid to enhance credibility (Amis, 2005; Côté et al., 1993; Patton, 2002). Clarifications were received from two practitioners, with the appropriate amendments made to the transcript prior to analysis. In the first instance, content analysis was undertaken in line with the recommendations of Côté et al. (1993), whereby meaning units were created from raw data segments. Inductive content analysis was then performed, whereby meaning units were grouped together in emergent categories based on their similarity to each other and distinction from other categories (Côté et al., 1993; Patton, 2002). This process was then repeated in order to generate higher-order themes until theoretical saturation was reached, whereby all new meaning units fit into the existing code structure (Strauss & Corbin, 1998).

As the researcher is the primary data collection tool within qualitative interviewing, the scope for researcher bias must be recognised. In a bid to aid credibility, conformability and dependability (Strauss & Corbin, 1998), an independent researcher experienced in both qualitative methods and talent development was invited

to critically analyse the emergent categories to ensure they accurately reflected the participants' quotations. Where this resulted in disagreement between the researchers, interpretations were put forward until an agreed explanation was found (as per Patton, 2002), leading to the re-categorization of four items.

4.3 Results

Following the analysis of the interview transcripts, four main over-arching themes were identified in the study: behavioural indicators; associated risk factors; associated protective factors; and identification and diagnosis issues. These emergent themes are presented and discussed in the following sections, with the themes italicised within the main text to aid clarity. Furthermore, an overview of the themes is presented in Table 4-1 at the end of this section.

4.3.1. Behavioural Indicators

A host of behavioural indicators were identified as being indicative of, or a precursor to, mental health issues. The primary indicator identified by all of the participants was that of *changes in behaviour and/or performance*. Deviations away from an individual's regular behaviour – particularly those that were currently unexplained – were highlighted as fundamental, and typified by the following example:

> Change. Identifying change is key. It's really a shift, and it's a shift over a period of time. So it's not just a one off, but if you get persistent behavioural change, then I would say that's a very important feature (Clinician 1)

Given its generality, such a behavioural indicator places an emphasis on the need to be familiar with an individual's regular patterns of behaviour, a point also reflected in the data. (e.g., "And if they know the kids really well, some [coaches] are good at picking up [the changes], if children aren't their normal self." (Clinician 4)).

Disruptive behaviours were also identified as potential indicators, along with issues around *not adhering to coaching and authority*, *displays of anger and aggression*, although these were not symptomatic of a particular clinical issue; rather, they were recognised as more general "warning signs" that warrant further investigation: "[you find out] more when you talk to them. So it would be more around the clinical questioning, I suppose, and trying to get underneath when things aren't working well" (Clinician 7).

Along with these more general characteristics, a range of behavioural issues associated with specific clinical issues were also identified. Indicators associated with *eating disorders* included unexplained or unscheduled weight loss (e.g., "And it's looking for the usual thing – a kid getting skinnier, without having suddenly put on a growth spurt" (Clinician 3)), low energy levels (e.g., "The heavy load sports – swimmers for example – couldn't keep going at a heavy session. And coaches have noticed that's been a lack of stamina has come up" (Clinician 4)), hiding the body with excessively baggy clothes, feeling the cold more readily than normal (or than their peers), and restricted eating, as typified by this example:

> I can think of a top climber who was eating mackerel salads for weeks, and I mean just a piece of lettuce and a piece of mackerel for tea; really small amounts to lose as much as possible before trying an ascent of a hard route. (Clinician 7)

The potential influence of weight on performance was cited as a key contributing factor, with practitioners acknowledging the delicate balance:

> It's about getting that balance just right… when you get a performance benefit from losing a bit of weight, it can be quite appealing to keep going with it" (Clinician 6)

The extent to which this could manifest itself was demonstrated by data from Clinician 4, with athletes taking seemingly drastic measures:

> I think with things like weight-making sports, you've got to get in and address it early. There was someone at the [city removed] Olympics in [name of sport] who cut their hair to try to make weight. Now the amount of hair [they] removed wasn't going to make a difference in the slightest. (Clinician 4)

Indicators of *anxiety* were reported throughout the data and were recognised as the most common types of issue presented to the clinical sports practitioners; even amongst the non-sport clinical psychologists, anxiety was reported as commonplace:

> So the major problems that we see come through [name of organization], a lot of that is around anxiety (Clinician 3)
>
> In terms of my clinical experience, I would say anxiety is more prevalent than depression, certainly more prevalent than psychosis, but we do get a skewed view in terms of children coming to see us." (Clinician 1)

Certainly within a sporting context, *performance anxiety* was reported as a contributing factor (e.g., "You'll certainly come across a lot of people who are very, very anxious before games. They're not sure how to channel that anxiety or those symptoms." (Clinician 3); "…and having to manage anxiety around performance is important" (Clinician 1)). Along with the performance aspects, issues around *social anxiety* were also prevalent (e.g., "…a young person I worked with as well had massive social anxiety, as in could barely even talk to me" (Clinician 7)). A range of performance-based consequences were attributed to or influenced by these anxieties, including panic attacks, communication breakdown, poor decision making, nervousness, the 'yips' and lost move syndrome, although this is likely not the sole contributing factor to such issues (see Carson & Collins, 2015).

Sharing a high level of comorbidity with anxiety disorders (American Psychiatric Association, 2013), *obsessive compulsive-type behaviours* were prevalent throughout the data, and were employed by people in a bid to control their environment

(e.g., "…actually it's about controlling their world. It's not just anxiety, it's controlling their world that feels out of control, even though maybe it isn't, and it's just one tiny aspect of it." (Clinician 2)). This manifested itself through a range of behaviours such as checking and rituals (e.g., "It's noticing things like do they have a ritual when they're packing their bags? ...I think towels were always lined up for [name of athlete] – I think it's noticing things like that" (Clinician 4)). Similarly, *superstitions* – differing from OCD-type rituals in their unreasonable beliefs around cause and effect, rather than a compulsion to act upon intrusive thoughts (American Psychiatric Association, 2013; Živanović, Ranđelović, & Savić, 2012) – were also recognised to impact upon an individual's performance and anxieties:

> A lot of superstitious behaviour is around in sport, and I think it's getting people to recognise that and then taking action. "This is a superstition, it's not a fact" … It's picking up things like that, that maybe gets "Oh I can't do this, I've not got my lucky rabbit's foot with me". (Clinician 4)

Depression, also highly comorbid with anxiety, was identified as a key issue, with behavioural indicators such as persistent *low mood*, *rumination* (e.g., "…ruminating on mistakes and getting very stuck in that 'I have failed" – it's all black and white. They're actually stuck in their heads." (Clinician 7)), *withdrawal* (e.g., "Are they not turning up? Are they ill a lot?" (Clinician 2); "They become quite isolated within the environment" (Clinician 5)), and *sleeplessness* (e.g., "But in terms of the younger people that I work with it's been sort of not sleeping, going back to ruminating" (Clinician 8)). *Sleeplessness* was also associated with *anxiety*, and was a particular issue when away from home or at training camps, as highlighted in the following example: "They were perhaps struggling with sleeping when they were away from home, things like that, and obviously [the coaches] didn't want to give them sleeping tablets, so teaching the behavioural techniques to manage anxiety [was

important]" (Clinician 4). As a precursor to *depression, emotional suppression* was recognised as potentially having drastic consequences to an athlete's development, as highlighted in the following example:

> So things trundle along and then all of a sudden you get burnout…
>
> Fundamentally, that suppression, that avoidance, that lack of acknowledgement of the emotional impact of what they're doing, longer term can set up high risk for depression – that bottle-bang... When a kid, all of a sudden one day turns around and says I don't want to do it anymore. (Clinician 5)

Obsession and perfectionism were recognised as a common feature, particularly amongst the clinical sport psychologists when compared to their non-sport counterparts. This was characterised by extreme perspectives and 'binary' thinking (e.g., "I think you also have a range of what might be called extreme perspectives, because players will talk about that they need to be unbelievably focused so they'll be successful. (Clinician 3); "It tends to be very much about the black and white thinking, that kind of all or nothing stuff. So either I've done this perfectly or I've completely failed" (Clinician 7)).

Issues around *self-harming* and around *self-medication* were recognised as features of the general clinical population, but were not reported by the participants as prevalent within sport. However, due to the qualitative nature of this study, and in particular the use of few, high quality subjects, caution should be taken when drawing any quantitative conclusions; an absence in this study does not necessarily suggest that this is not an issue in a sporting context.

4.3.2 Risk Factors

Of the risk factors identified, *family background and home life* was the most widely acknowledged. An *unstable home life* was cited as a key issue (e.g., "If it's an

unstable home, if there's trauma in the person's background, then they don't have the resources themselves, the resilience to deal with [setbacks]" (Clinician 2); "…Often dating back to divorce; the parents separating, and just having a hard time at home." (Clinician 4)). Similarly, other family-related issues have been seen to have an impact, such as caring for a parent:

> So kids who have become carers in any form, in my view always have a certain amount of struggle as to their role in life, as to whether they take care of people or whether they take care of themselves, and their childhood is compromised. (Clinician 2)

However, a stable family background does not in itself mitigate any associated risk, as each of the clinical psychologists highlighted the potentially detrimental role of *pushy parents*:

> One of the kids that I was thinking about who came to me very, very socially anxious, was more pushed in to the coaching by his dad than he wanted to be himself… he was a very talented climber and I think he's pretty much off the radar now. (Clinician 7)
>
> But there could be a lot of pressure. I'll never forget in skating, sitting at a competition and people going on about "their parents must be so embarrassed", and I was thinking that's really interesting, the comments and the investment that the parents are making (Clinician 4)

The *performance environment* was recognised to bring with it a range of factors that could increase the risk of developing mental health issues. With wide-ranging consequences (or at least perceived consequences) surrounding performance failure, *pressure to perform* was a key driver for many of the potential associated issues (e.g., "everything is task oriented [i.e., tasks must be completed], goal driven – that, we know, or at least we have strong indicators that that style over time increases our risk of mental

health problems" (Clinician 6)). The *competitive nature* of the environment was particularly associated with *hiding weakness*, which was seen to carry potential negative consequences:

> And if that mentality of remaining tough and not wanting to show any weakness on the pitch, if you take that in to your daily life, the potential is you can't show any sort of weakness whatsoever, and that will stop you getting help and support. (Clinician 3)

Such a competitive environment and the associated impression management was also viewed as being potentially self-perpetuating:

> Sometimes the things that are valued in elite sport environments are the very things in the short term that look really good, but in the long term increase the risk of future difficulties… So you hear things like mature for their age, independent, driven, focused. And of course it's not just the individual – the system gets seduced to reinforce that, as do the coaches. So you've got an individual who's perfect, who's the ideal kid – they worry the hell out of me. (Clinician 5)

As a fundamental part of the talent development pathway, *transitions, deselection and exit* were identified as potential obstacles that, without the appropriate skills and/or support, could increase the risk of a young athlete developing mental health issues:

> Well the obvious one is not making it, and then what does that mean for your life? If you look at a CV and everything on it is going towards one goal, and they don't make that goal, where do they go then? (Clinician 1)
>
> If there's a transition – I'm a 17 year-old, I'm idolised by everybody and then I'm put up in to the 19s or in to the senior squad, and I'm now not the best in the class – how will they cope? (Clinician 5)

As 'micro-transitions' themselves, periods of *injury* also posed potential risk (e.g., "Even if you're out for six weeks, it's a big issue because you don't feel part of that

training squad, that camaraderie, you become distanced from it. Watching from the side lines is a lonely place" (Clinician 3)), especially if rehab is problematic or is over a long period of time:

> I think we mustn't forget as well that with chronic long term injury, people can get depressed too, just because they're not getting that – and that was often a factor with people in their rehab – they weren't getting where they wanted to be. (Clinician 4)

Away from the performance environment, *developmental risk factors* included *adolescence* itself (e.g., "I think in adolescence, and understanding the nature of adolescence, which is very black and white, I think it's only as we get older that we realise that life has more grey." (Clinician 2)). Differing levels of physical maturity was seen to be potentially problematic both on an individual level for the young person and how it affects their relationships with others:

> Adolescence is such a time when you're super sensitive as to the world around you, so it's a very insular thing, but it's also about how I fit in the world, and if you're not fitting in for any tiny thing then it seems to exacerbate everything else. (Clinician 1)

> Children are not mini adults and we treat them as mini adults. They're developing, so physically they may develop. A 15 year-old in rugby, for example, they may physically look like they're men but they're still sometimes little boys. (Clinician 5)

Similarly, issues around *identity and attachment* were shown to have developed over time, with an attachment to the sport often viewed by the individual as a valuation of their own worth. This can then become problematic if their sport performance subsequently dips:

> So being good at something gives you a sense that you're a good person, therefore if you start to play up and you're not so good at something, and this can work one way or another, then the very thing that keeps you thinking you're a good person, you're not doing so well, and that can tip you in to a negative spiral. (Clinician 5)

Social risk factors included issues around *peer pressure* (e.g., "What are your peer group doing? Are you going to do the same or are you aware that your sport needs to be your focus?" (Clinician 8)), *social evaluation* (e.g., "[Sport]'s a really small community, so everybody knows each other and there's that sense of your performance is always being evaluated by somebody else. So that's one of the biggest things that I think holds people back" (Clinician 7)), and due to the unique nature of talent development environments, *peer competition*, whereby your peers within a system are also your rivals for the finite number of positions available at elite level. This was seen to compromise the effectiveness of peer support.

> If your social network is around those squads of 20-30 players, there'll always be jealousy. Players will think I should have got that contract, so that will impact on the potential social interactions with those people again for the future. (Clinician 3)

> Often it's when they've become very much attached to their peer group, and that isn't very supportive particularly, and again it's not a place for them to necessarily talk about things that are going wrong for them, because they might see that as showing weakness (Clinician 1)

4.3.3 Protective Factors

In contrast to the risk factors identified above, a range of protective factors were also identified. Of primary importance were the *social protective factors*, deemed to have a significant positive influence on an adolescent's development. Of these social

factors, the role of *parental and family support* was viewed by the participants as fundamental to wellbeing throughout development:

> There's something out of child development that says there are some kids that have got immune to certain things because they've had good supportive upbringings, so although they might be upset by a bereavement or a separation of their parents for example, they might not be as bad as others because there may be a good stable grounding behind them. (Clinician 1)

Similarly, having an *interested role model* to look up to was recognised to have a positive effect throughout development, again through providing stability (e.g., "Sometimes being almost like a surrogate parent – the stable person in their lives, being there for them no matter how much they're acting out. That you're still there but you're not tolerating necessarily" (Clinician 2)). Despite the nature of many talent development environments necessitating between-peer competition (e.g., for professional contracts), *peer support* was evident as a protective factor in some circumstances (e.g., "A lot of players will find support, so if a couple of players are injured, if they're doing the same rehab at the same time, [they'll help each other through]" (Clinician 3)). Such utilization of social support was recognised to be underpinned by the ability to form good *relationships*:

> It wasn't about ability, so it wasn't the brightest from there that did best, it was the ones that did best in other areas so that sort of being able to create and make good relationships seems to be a very key element. (Clinician 1)

An *open and supportive coaching environment* was seen as a valuable way to encourage building those types of relationships, as well as providing opportunities for role modelling:

> But from a coach's perspective, it's about opening up a conversation, if it's possible to do so. You have to have an environment to do that…. If it isn't with

> the coach, who's it going to be with? You have to have that link person or somebody who's trusted enough to speak to. I think trust and confidentiality is the key really. (Clinician 8)

4.3.4 Identification and Diagnosis Issues

Throughout the data, key issues around identification and diagnosis were raised. Of these issues, all participants highlighted the need for greater *awareness of clinical issues* that impact upon adolescents. This requirement was not limited to the coaching environment, but was felt to be an issue for everybody deemed part of the young person's life. This increased awareness was not only deemed important to help identify the issues more effectively, but also to increase awareness around how to take the first steps in addressing the issue, as highlighted by the following example:

> I think awareness is really important. I was just speaking to a father the other day about his child and he just didn't have a clue. He's obviously a very nice man, but he didn't have a clue about how you got help, what help was there, and he was a very able individual. It wasn't like he was somebody who didn't know life, but when he was faced with anxiety in his child, he didn't have a clue what to do. (Clinician 1)

However, simply increasing the awareness of symptoms was recognised as problematic, due to the *multiple causes of symptoms*, especially symptoms associated with normal adolescent development (e.g., "Especially dealing with teenagers. They've got a hell of a lot on their plate, haven't they, so you can't be sure what was causing the issue." (Clinician 7); "So sometimes it can be a little difficult easing out what's normal adolescent behaviour and what actually we should be worried about." (Clinician 4)).

Muddying the waters further is the issue of non-disclosure. *Non-disclosure by athletes* was attributed to two main factors: a lack of self-awareness and a reluctance to

disclose their concerns about their mental wellbeing. *Lack of awareness* was particularly an issue for the younger adolescents, with some issues more likely to be picked up than others (e.g., "Insight's a difficult thing, and sometimes I think it is hard to know what's wrong because you're just feeling rubbish. Or if things aren't going right or nothing seems to be right at the moment." (Clinician 1); "Whereas they might actually say "Oh, I do feel funny" and they might be experiencing a panic attack. They're more likely to talk about that than a feeling of sadness." (Clinician 4)). A *reluctance to disclose* to somebody was recognised to occur for multiple reasons. Inhibiting factors included that of stigma around mental health issues (e.g., "I think across many sports I think stigma is a really big issue" (Clinician 3)), the potential impact it may have on future selection (e.g., "…you may be worried about the potential impact – it depends upon the coach, I think" (Clinician 8)), and fear of upsetting others, particularly parents (e.g., "The issue that I've found, … is that children and young people really don't like telling their mum and dad because they don't want to upset them." (Clinician 2)). Away from the individual, *non-disclosure by others* was also recognised as a significant barrier. Despite recognizing potential issues in adolescents, significant others were often seen to attribute them to developmental 'phases' and were therefore unlikely to seek further help in addressing them:

> And that notion of "it's just a phase", generally speaking, probably isn't a great thing. It can be, you know, it can be at times, but if something persists, then you do need to go about getting help… I think parents try to be very optimistic. They don't really like the idea of their child not being quite right. (Clinician 1)

In order to address this obfuscation, a range of actions were identified as necessary. *Observation* was utilised on an individualised level, in order to pick up on any potential issues (e.g., "When you've got them there at an academy, you're going to have at least one coach who would pick up perhaps some of the issues as well."

(Clinician 4); "I think it's about extremely observant people, and it comes back to people getting to know each young person as best they can, so that actually that's when you start to notice when things are different." (Clinician 2)), clinical questioning skills were employed by practitioners where appropriate, and a range of *assessment and screening tools* were administered, including the Generalised Anxiety Disorder 7 item scale (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006) and the Patient Health Questionnaire 9 item scale (PHQ-9; Kroenke, Spitzer, & Williams, 2001):

> In the education sessions we use with players, we use the PHQ9 and GAD7. We don't ask the players directly, we ask them to think about people who they might know who might be stressed, which is usually coaches. So they get to listen to those ideas around that, or perhaps assess a former player and get them to tell us if they think there's a problem or not. (Clinician 3)

However, there were several notable limitations to such an approach, including the emotional literacy of the subject (e.g., "So I think for some of the people, there's a degree of emotional literacy that you need first before you could get anywhere with even a questionnaire." (Clinician 7)), and the sensitivity of the assessment tool itself (e.g., "You have to be more subtle, which is why questionnaires and these things fundamentally don't work, because you don't pick up" (Clinician 6)). In recognition of such limitations, assessment tools were used by practitioners as part of a triangulation process as part of an assessment, and sometimes as a guide for more informal conversations.

Table 4-1. Mental Health and Clinical Issues in Talent Development

Higher Order Theme	Theme	Sub-Theme
Behavioral Indicators	Anger & Aggression	-
	Anxiety & OCD-type Behaviours	Obsessive Compulsive Disorder
		Performance Anxiety
		Social Anxiety
		Superstition
	Changes in Behaviour	-
	Communication & Interaction	-
	Depression & Low Mood	Rumination
		Withdrawal
	Disruptive Behaviour	-
	Eating Disorders	Excessive Focus on Bodyweight
		Hiding the Body
		Low Energy
		Weight loss
	Emotional Suppression	-
	Injury & Illness Behaviour	-
	Non-Typical Development Patterns	-
	Not Adhering to Coaching & Authority	-
	Obsession & Perfectionism	-
	Phobias	-
	Self-Medication	-
	Self-Harm	-
	Sleeplessness	-
Identification & Diagnosis Issues	Assessment & Screening Tools	-
	Awareness of Issues & Symptoms	-
	Individualised Approach	-
	Multiple Causes of Symptoms	-

	Need for Clinical Skills	-
	Non-Disclosure by Athletes	Lack of Awareness
		Reluctance to Disclose
	Normal Developmental Behaviour	-
	Observation	-
	Understanding the Athlete's Environment	-
Protective Factors	Open & Supportive Coaching Environment	Communication
		Safe Environment
		Structure & Purpose
	Social Protective Factors	Interested Role Models
		Parental & Family Support
		Peer Support
		Effective Relationships
Risk Factors	Body Image	-
	Developmental Risk Factors	Adolescence
		Attachment & Identity
		Cognitive Ability
	Family & Home Environment	Pushy Parents
	Performance Environment	Club Culture
		Competitiveness
		Deselection, Transition & Exit
		Excessive Downtime
		Performance Pressure
	Social Factors	Isolation & Removal from Peer Group
		Peer Competition
		Peer Pressure
		Social Evaluation
	Unbalanced Approach to Sport	-

4.4 Discussion

A range of clinical issues were identified within the data, including eating disorders, anxiety and depression, each with negative consequences for developing athletes. Due to the qualitative and exploratory nature of this study, the results do not and cannot indicate any order of prevalence or importance of issues; only their existence in the specified domain. However, by simply being present, irrespective of scale, these issues warrant merit; if not diagnosed and / or managed appropriately, their consequences were recognised to, at best, increase the likelihood of derailment from the talent development process. Accordingly, there is a clear and obvious need for effective identification strategies, supported by appropriate interventions, in order to ensure the wellbeing of the athlete, whilst simultaneously maintaining the efficacy of the talent development process.

The key clinical and mental health issues identified by the participants within developing athletes yielded a specific set of behavioural indicators that trained clinicians could readily identify. Concurrently, the onset of mental health issues in young people was also reported to yield a set of more general indicators in the form of behavioural change, and – more specifically – unexplained deviation from an individual's behavioural norm. It was suggested that these more general "warning signs" would be readily identifiable to those without a clinical background, on the proviso that they were familiar with the individual concerned, their specific circumstances and their normal patterns of behaviour; a fact borne out by recent literature (Mazzer & Rickwood, 2014). However, this suggestion is in some part contradicted by the data presented in this study. Given that athletes often have very close working relationships with their coaches (Davis & Jowett, 2014; Sherman et al., 2005), yet the data stated that many young people still "slip through the net", it becomes

apparent that coaches are often struggling to identify such changes (let alone signpost or seek a referral). The need to address such a shortcoming in the identification process is therefore crucial – especially given the potential consequences for the individual concerned – of mental health issues going undiagnosed and untreated.

Simply providing coaching staff with a clinical skillset would go a considerable way in addressing the problem of under-identification, yet such an approach is logistically unfeasible. (To do so would likely require years of training, qualifications, expense, time away from actually coaching, and above all, a willingness to do it on the coaches' part). To address the problem satisfactorily, a wider, more systemic approach is needed. One such approach would be the incorporation of trained clinicians in to talent development environments, facilitating not only effective identification of clinical issues, but also appropriate clinical interventions. Again, however, this would likely be a decision based against operational and financial considerations. A more practical proposal would focus on the coach-athlete relationship. As the data suggests, coaches who have a long-standing relationship with their athletes are well placed to identify when something's not right, so interventions that are targeted to improve the efficacy of this partnership could be very beneficial. Simply educating coaches and support staff around the importance of recognising unexplained or unexpected behavioural change as a precursor to, or indicator of the development of a mental health issue, could potentially result in the issue being flagged and referred in the first instance. How often have you thought to yourself when driving your car "that noise doesn't sound quite right," at which point you take it to the garage to get looked at? The principle here is just the same, yet the consequences of ignoring such a sign could potentially be far greater than being sat on the roadside for an hour waiting for a recovery vehicle to turn up! Continuing the metaphor (maybe a little too far?), the next step is to locate the 'garage', i.e., if a coach has identified a potential issue with an individual, they need to

know what to do next. Further education around signposting procedures, external support agencies and referral protocols should greatly increase the likelihood of the individual receiving the support they require.

As part of a triangulation process, participants recognised the role of validated psychometric assessment tools to help formulate a diagnosis and / or monitor progress. Similarly, the adoption of a practical, ecologically validated tool that highlights potential issues associated with mental health could aid in bringing to the fore specific "warning signs" that may otherwise have gone unnoticed. Such psychometric tools have been widely adopted in sport as a type of formative assessment that can facilitate appropriate interventions (e.g., the PCDEQ; MacNamara & Collins, 2011). Whilst many such assessment tools focus on characteristics that are deemed adaptive to development and / or performance in sport (e.g., Duckworth & Quinn, 2009; Gucciardi, Hanton, & Mallett, 2012; Scanlan, Chow, Sousa, Scanlan, & Knifsend, 2016; Toering et al., 2013; Zervas, Stavrou, & Psychountaki, 2007), there remains a sizeable question mark over the use of (or rather lack of) such tools to help identify signs of mental illness in developing athletes. If psychometric tests are commonplace in talent development environments, and the detection of mental health issues in these environments is sub-optimal, then such a tool that helps identify potential issues as part of a triangulation process (combined with other measures such as behavioural observation), combined with appropriate signposting and referral systems, could go a significant way to addressing mental health in talent development.

Despite such recommendations for improving the effectiveness of identification and intervention around clinical issues in talent development, the key points of prevention and limiting their development still remains. In order to address this, an examination of the associated risk and protective factors is required. Of the risk factors identified within the data, social issues around an athlete's background and family life

were deemed the most impactful by the clinicians interviewed. The role of the family was seen as particularly important, especially given the potential psychological stress caused by significant life events such as family bereavement (Sarkar & Fletcher, 2014; Sarkar et al., 2015), parental divorce (Amato & Keith, 1991; Amato & Sobolewski, 2001), and caring for family members (Aldridge & Becker, 1999). Such key events, along with the broad range of issues readily associated with the transition from adolescence to adulthood (see MacLeod & Brownlie, 2014) are not confined to the domain of talent development, but are more general in both nature and genesis; a fact borne out by the data. As such, there is limited practical scope for preventative or remedial action by the talent development system to mitigate the impact of these issues, other than by helping to support (directly or indirectly) the young athlete through the process. However, one family-based risk factor where the talent development environment can have a proactive and positive impact in mitigating the maladaptive influence of parental behaviour; in particular, the role of the 'pushy' or 'problem' parent.

As key stakeholders in the talent development process (Pankhurst, Collins, & MacNamara, 2013), parents are highly influential in establishing an athlete's motivational climate through their values and behaviours (Gould, Lauer, Rolo, Jannes, & Pennisi, 2008; Gustafsson, Hill, Stenling, & Wagnsson, 2015). Consequently, athletes are not only able to benefit from supportive parents, but are also susceptible to a parent's own anxieties around their child's performance (Beidel & Turner, 1997; Ginsburg, 2009; Sagar & Lavallee, 2010). Given the amount of time, money and emotion invested by parents in their child's sporting success, it is perhaps then unsurprising that such anxieties can manifest themselves as behaviours detrimental to both the athlete's wellbeing and development, such as over-involvement (Wuerth, Lee,

& Alfermann, 2004), negative verbal behaviours during performance (Kidman, McKenzie, & McKenzie, 1999), and negative debriefing (Elliott & Drummond, 2015).

Despite the likely underpinning good intent, there appears to be a lack of common understanding of the parental role between parent and child in a talent development setting (Kanters & Casper, 2008). Accordingly, it is the perceptions and possible misinterpretations of these parental behaviours that, in turn, often act as sources of acute stress for the developing athlete (Babkes & Weiss, 1999; Kanters & Casper, 2008; Puente-Diaz & Anshel, 2005). Despite issues such as anxiety and fear of failure having been shown to transfer from parent to child, such transference has been demonstrated as amenable to intervention (Ginsburg, Drake, Tein, Teetsel, & Riddle, 2015; Sagar & Lavallee, 2010). Similarly, group education-based interventions have also proved effective at facilitating adaptive parental support through the provision of "real world" strategies and improved awareness (e.g., Richards & Winter, 2013). Based on the apparent success of such programmes, and given the established need within a talent development setting, the implementation of proactive, education-based interventions aimed at promoting parental awareness of the issues around talent development – in particular the impact of parental behaviours on a child's mental wellbeing – should be commonplace within talent development environments.

In many respects, the range of protective factors identified within the data offer a reflection of the risk factors also presented. For example, whilst the family, the competitive nature of the talent development environment, and social evaluation from peers have all been identified as potential sources of stress, family and parental support, an open and supportive coaching environment, and peer support were said to play a significant role in protecting an athlete's mental wellbeing. The fact both the family environment and the talent development environment can offer both protection from and susceptibility to mental health issues highlights the importance of the effectiveness

of the relationships formed between the people within these environments; a point borne out by the data presented here. Accordingly, talent development environments should seek to establish and actively promote such relationships throughout their system. Concurrently, supportive family relationships must also be fostered wherever possible, in a bid to offer each young athlete the best possible protection and support.

An important consideration for any of the proposed interventions around mental health – and indeed, all things 'talent development' – is the inherent complexity of both the system and human development. Given that the role of the talent development environment is to prepare a developing athlete for elite level competition, and that elite sport is widely recognised as both high pressured and highly competitive (Jordet, 2009; Pensgaard & Roberts, 2000), addressing the risk to mental health associated with the environment's competitive nature proves problematic, and must be done with care. A reduction in the level of competitiveness and / or pressure within a talent development environment may – in the short term – allay any concerns over a developing athlete's mental wellbeing. However, such an approach may only serve to under-prepare an athlete for what lies ahead of them in the domain of elite sport, thus potentially exposing them to the risk of potential mental health issues in the future when faced with such pressures and expectations. Conversely, it would be ethically wrong for talent development environments to ignore short term pressures and compromise athlete wellbeing just because they have an effective referral system that will pick up the pieces behind them. Acknowledging this level of complexity, the answer to the question "*How do we effectively address the issue of mental health in talent development?*" is an emphatic "*It depends!*"

In such situations as this, professional judgement and decision making (PJDM; see Martindale & Collins, 2005, 2007, 2012) offers an effective way of negotiating complexity by not only assessing the required needs of a subsequent intervention, but

by paying particular attention to the mediating process of issue conceptualisation. Addressing the intentions for impact – the rationale for selecting a specific behaviour or intervention design – allows the professional to address a wide range of considerations that will determine the ultimate efficacy of an intervention (Hill & O'Grady, 1985; Martindale & Collins, 2005). Such an approach to managing complex decision making processes has been shown to be effective in both elite coaching (Abraham, Collins, & Martindale, 2006), and in applied sport psychology (Martindale & Collins, 2013), and therefore can be deemed appropriate for this context.

Accordingly, adopting a PJDM approach to managing the mental health of developing athletes would involve a series of key considerations prior to formulating an effective intervention. First, careful consideration must be given to the potential impact on an individual's mental wellbeing of any likely outcome of an intervention. This would require a good level of understanding and awareness of the individual involved, their environment and of clinical and mental health issues, and would therefore need to be underpinned by specific training where appropriate. For example, a transition from an academy programme into elite competition brings with it many pressures, such as a heightened emphasis on results and increased expectation. Such pressures are often associated with fear of failure (Sagar, Lavallee, & Spray, 2007), and the resultant defensive behaviours[1] such as avoidance (Birney, Burdick, & Teevan, 1969) have been linked to mental health issues (Grant et al., 2013). As such, appropriate measures to mitigate the detrimental impact of such pressures may be required. Second, the active promotion of protective factors *prior* to periods of increased stress must be ensured, requiring a level of foresight and management. Third, regular monitoring of both

[1] The mechanisms behind fear of failure and the deployment of defensive behaviours are addressed in detail in Chapter 5

coping skills such as PCDEs and of mental wellbeing would be required in order to maintain the appropriate level of challenge for the individual, and to target the necessary areas for development. Such monitoring should incorporate an appropriate and ecologically valid psychometric tool, behavioural observation, clinical input where available, and dialogue between all parties concerned, as part of an effective triangulation process. Finally, appropriate support and signposting must be provided where necessary, in order to not only identify emerging mental health issues, but also to address them effectively. This is of particular importance, given that timely intervention is often recognised as the key to successful treatment (Kamm, 2008).

4.5 Conclusion

This chapter set out to identify the impact of mental health and clinical issues on talent development processes through a series of qualitative interviews with clinical psychologists. The primary issue to emerge from this data was that clinical issues and poor mental health serve to derail the talent development process through a variety of ways, all negatively impacting upon the interaction between athlete and environment. A key consideration supported by this study is the challenge to the misconception that mental ill-health is the sole preserve of elite sport and retired athletes. Instead, a shift in focus towards the developing, adolescent athlete is required in order to target support and preventative measures more effectively, thus improving both player development and, more importantly, player welfare.

Based on the data presented in this chapter, a series of key recommendations and issues are raised, with a view to informing and improving current practice. First, the incorporation of clinical expertise into the talent development process is crucial. This should be done either through direct integration into the system (e.g., full time employment), or through clear and obvious referral processes. Without such clinical

expertise in place, diagnosis and intervention cannot occur. Second, as those best placed to identify more general warning signs of mental health issues, coaches, support staff, and those with pastoral responsibilities are likely to require training, education, and support in dealing with such issues, including clear signposting procedures to enable young people to access the appropriate support. However, given the often obfuscated nature of symptoms relating to mental health, without the appropriate tools, identifying issues with limited (if any) clinical training is hugely problematic. Accordingly, the third recommendation would be the development and deployment of an ecologically validated and reliable assessment tool to be used as part of a triangulation process, to aid in the regular monitoring of athletes' coping skills and mental wellbeing throughout the development process. Finally, as effective relationships are fundamental to an environment's protective qualities, such supportive relationships need to be established and actively promoted throughout. Through the implementation of such measures, the effectiveness of the talent development process will be improved due to the potential decrease in talent derailment. This is, however, of less significance than the positive impact it will have on the mental wellbeing of young athletes.

5. FEAR OF FAILURE, AND OTHER DUAL EFFECT CHARACTERISTICS

5.1 Introduction

Building on the evidence presented in Chapter 3 and the associated literature, it becomes apparent that the psycho-behavioural characteristics associated with effective talent development are not purely dichotomous, but are, in fact context specific. Constructs such as perfectionism (Flett & Hewitt, 2005; Stoeber, 2011), fear of failure (Conroy, 2001; Sagar, 2009), and commitment (Hetland et al., 2012; MacNamara, 2011) may actually be either adaptive or detrimental to development, depending upon situation and context. Such shades of grey render the adoption of a "promote the good, prevent the bad" approach to developing psychological skills problematic. How much commitment is too much? If almost flawless performances are required to win medals, how much perfectionism is enough before it becomes maladaptive? If we are on a quest for success, what happens when we fail?

But perhaps these are the wrong questions to be asking. Given the complexity of human interaction (see Chapter 2), straightforward, simple answers (and questions) can often fail to acknowledge and account for the subtleties that explain observable differences. Instead, more explicative power may be wielded not by focussing on the "how much?", but rather, by asking the question "*why?*"; namely the underpinning processes that determine these outcomes. Why do these constructs offer both adaptive and maladaptive outcomes, why are some people affected by it more than others? As such, this chapter seeks to explore the underlying mechanisms behind these dual-effect characteristics and behaviours in order to determine their potential impact on the

development process; and a great deal of explicative power may lie in the role of fear of failure.

5.2 Fear, Failure and Fear of Failure

Fear of failure (FF) research has primarily concentrated on academic settings, with comparatively – and perhaps surprisingly, given the highly evaluative environment in which athletes compete – little attention given to sport until recently (Sagar et al., 2007). Within academia, FF has been associated with poor self-esteem, self-handicapping, decreased motivation, decreased quality of engagement in achievement activities, cheating in academic tasks and the adoption of avoidance behaviours (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Martin & Marsh, 2003; Monte & Fish, 1989). Elsewhere, FF has been associated with eating disorders (Conroy, 2001), anxiety and depression (Singh, 1992), drug abuse (Anshel, 1991), and dropout in youth sport (Sagar et al., 2007). As Chapters 3 and 4 highlight, such issues are also associated with, and apparent in talent development in sport (see also Hill, MacNamara, & Collins, 2015; Hill, MacNamara, Collins, & Rodgers, 2016). With sport a significant achievement domain for children and adolescents (Treasure, 2001), and that given over this time frame (i.e., 11-18 years of age) fears relating to failure, criticism and social evaluation can emerge (Gullone & King, 1993; Sagar et al., 2007), the scope for FF potentially impacting upon talent development processes becomes apparent.

Fear has been defined as "a state of being scared or apprehensive and is an emotional reaction to the perceived threat that one seeks to avoid" (Sagar, 2009, p. 5). As such, it is a subjective emotional state with environmental antecedents and certain causal behavioural consequences (Gray, 1987). The association between specific stimuli and *perceived* threat (not necessarily an actual one; see Conroy, 2001) results in a fear response, and, in a bid to avoid an undesirable outcome, defensive behaviours are

adopted (Birney et al., 1969; Conroy & Elliot, 2004; Field & Lawson, 2003; Gray, 1987; Sagar, 2009). Within performance domains such as sport, failure can be one such undesirable outcome, and this is often interpreted by the athlete (amongst others) as a function of winning and losing (Sagar et al., 2007). Losing in particular has been associated with greater anxiety, dissatisfaction with performance and negative social evaluation (Grant et al., 2013; Sagar & Lavallee, 2010). Similarly, quality of performance has also been suggested as a basis from which athletes attribute success or failure (Passer, 1983). Given such underpinning mechanisms, FF in the context of sport – and in particular talent development – can therefore be conceptualized as a fearful reaction to the perceived consequences of losing and / or poor performance.

In examining such perceived consequences, early achievement motivation literature posited FF as a unidimensional construct that positioned shame at its core (e.g., Atkinson, 1957; McClelland et al., 1953), and that resultant behaviours sought to avoid the feeling of shame within achievement settings. More recently, however, multidimensional models of FF have been proposed that not only support the role of shame in facilitating avoidance behaviours, but also acknowledge a wider range of aversive consequences of failure. Conroy and colleagues identified a range of other consequences, such as a reduction in an individual's self-estimate, uncertainty around future events, the receipt of non-ego punishment, and a reduction in the individual's social value within the achievement domain in relation to others (Conroy, 2001; Conroy, Metzler, & Hofer, 2003; Conroy, Willow, & Metzler, 2002). Interestingly, when failure is defined purely as the non-attainment of a goal (i.e., with no undesirable consequences), then this is not in itself aversive as it does not necessarily elicit a fearful reaction (Birney et al., 1969). Instead, individuals learn to associate failure with its consequences and the impact they may have upon meaningful goals, and it is *these consequences* that then become feared, not failure itself (Birney et al., 1969; Sagar et

al., 2007); thus perhaps rendering the term "fear of failure" a misnomer. For example, within sport, a poor performance in training or competition may result in a coach administering some form of punitive measure to an athlete or perhaps lead to potential non-selection for a representative squad, and it is the punishment or non-selection that is feared, not the preceding performance. Consequently, individual differences in FF will appear over time based upon each individual's differing experiences (Conroy & Elliot, 2004; Sagar & Jowett, 2012).

Having appraised a perceived threat and given the corresponding beliefs associated with the consequences of failure, individuals high in FF adopt a range of defensive behaviours and strategies designed to mediate any potential negative consequences (Sagar, 2009). Such an approach to threat reflects that of psychological defence; a process aimed at maintaining a desired self-image, including that of competency in the face of threatening feedback (Rhodewalt & Vohs, 2005). The defensive behaviours associated with FF have been categorized as avoidance and/or not trying, reducing the achievement standard, and exerting maximum effort (Birney et al., 1969; Sagar, 2009). Each of these types of behaviour are ultimately aimed at mitigating the likelihood of the expected aversive consequences, either through limiting the opportunity for failure to occur (e.g., through avoidance coping or exerting maximum effort), or by providing alternative, less-threatening reasons for sub-optimal performances (e.g., self-handicapping or external attribution). Within a talent development setting, however, adopting such behaviours as a means of defence may actually have unintended consequences, and in order to fully understand the impact of such behaviours, it is first important to consider the development process itself.

5.3 Fear of Failure in Talent Development

Talent development is recognized as a non-linear, dynamic process of (often strategically programmed) interactions between an individual and their environment in order to elicit emergent behaviours (see Abbott et al., 2005; Phillips et al., 2010; Simonton, 1999). By administering appropriate and targeted challenge, and given an athlete's self-determination, skills and confidence to overcome such challenge, the individual undergoes a process of self-organisation whereby functional solutions are developed and deployed (Davids et al., 2008; Kelso, 1995; Renshaw et al., 2012; Rosenbaum, Augustyn, Cohen, & Jax, 2006; Ryan & Deci, 2000). To illustrate this, take the following scenario:

> *A young developing athlete is stood in a world-class strength and conditioning facility, he has had a program developed by his coach underpinned by the latest scientific knowledge, and is required to perform a squat exercise. The weights are all set up on the rack for him, waiting to be lifted. He is alone.*

Now for that athlete to become stronger, he has to walk over to the rack, pick up the bar and lift the weights (the interaction). If he does this for the prescribed number of repetitions (the targeted challenge), then given an adequate recovery strategy, micro-trauma caused to the muscles will be repaired to a state whereby they are better equipped to deal with the challenge next time (the self-organisation). However, for this to occur, one critical component has to be present: volition. The athlete has to *choose* to lift the weights. As there's no one watching him, he could very easily choose not to lift the weights. There is nothing *making* him do it. He could even say that he did, fill in his program accordingly, and nobody would be any the wiser but, crucially, he would not develop. It is at precisely this point – the cognitions that precede and govern the interaction between the athlete and their environment – that the defensive behaviours

associated with FF can impact upon the talent development process. In short, development is both cognitively induced and cognitively disrupted!

Of the different types of defensive behaviours identified, avoidance has the most obvious detrimental impact upon effective talent development. By avoiding the prescribed challenge completely, athletes are removing any opportunity for self-organisation – the point at which development occurs. In support of this, avoidance-based defensive behaviours have been found to be characteristic of athletes who have failed – despite physical and / or performance advantages – to progress to elite levels, with coaches typically describing instances of young athletes seeking to avoid challenging situations along the development pathway (see Chapter 3; Sagar, Lavallee, & Spray, 2009). These findings stand in stark contrast to how successful athletes describe their interpretation of similar developmental challenges as periods of growth and development (Collins, MacNamara, & McCarthy, 2016; MacNamara et al., 2010b). Subsequently, the individuals adopting such avoidance behaviours, despite limiting their opportunity for failure and thus protecting themselves from any potential aversive consequences such as social evaluation, were also limiting their opportunity to engage in developmental challenge. This point is fundamental to FF's maladaptive role within talent development, as it is the successful negotiation of challenge, and the learning that accrues as a result of this process, that leads to development (Abbott et al., 2005; Collins & MacNamara, 2012; Phillips et al., 2010) and, without these growth experiences, improvement is unlikely to occur. Furthermore, both cognitive and behavioural avoidance coping strategies have been shown to have a reciprocal relationship with anxiety and depression (Grant et al., 2013), and are therefore likely to impact upon an athlete's wellbeing if left unchecked (Hill et al., 2016).

As another type of defensive behaviour, reducing the achievement standard is a strategy also recognized with many unsuccessful developing athletes, manifesting itself

in a variety of ways such as self-handicapping or external attribution (Conroy & Elliot, 2004). Self-handicapping has been shown to undermine performance attainment, reflecting an absence of approach motivation and the presence of avoidance motivation (Elliot & Church, 2003) and bringing with it the maladaptive consequences of non-engagement with developmental challenge as described previously. By constructing barriers to performance, failure can then be attributed to these barriers, thus protecting the individual from the associated shame and embarrassment within such highly evaluative contexts (Conroy, 2001; Rhodewalt & Vohs, 2005). Despite some research suggesting there are potential benefits for externally attributing critical events (e.g., Weiner, 1985), in doing so, the responsibility and / or necessity to address performance shortfalls is diminished and, as a result, the opportunity for development becomes limited.

The final defensive behaviour is that of exerting maximum effort in a bid to avoid failure. Unlike the previous defensive strategies, exerting maximum effort does not initially compromise developmental interaction; indeed, it could actually potentially facilitate more developmental interaction through increased quantity and / or intensity of training. So, in this context, such adaptive consequences could lead to FF being considered a "dual effect" construct, whereby its associated behaviours can either be adaptive or maladaptive in relation to talent development, depending upon context and level of application (MacNamara & Collins, 2015). However, even this seemingly positive consequence of FF is not without its potential pitfalls, as excessive training loads can contribute to overtraining, reduced performance and burnout (Budgett et al., 2000; Lemyre et al., 2007; Quested & Duda, 2011; Sagar et al., 2009). Furthermore, it assumes that the maximum effort is being correctly expended on the areas of maximum return; something found to not always be the case (see Chapter 3). Consequently, if

maximum effort-based behaviours are to be maintained for prolonged periods or in the wrong areas, any potentially adaptive consequence may be offset by maladaptive ones.

So, given the potential impact FF and its resultant defensive behaviours can have on the talent development process, the need for it to be addressed becomes apparent. In order to do this, it is perhaps pertinent to not only examine the conditions that can lead to the development of FF within an individual (as described previously), but also the social milieu in which it may occur. As key stakeholders and decision makers, parents and coaches are highly influential within the talent development process and, consequently, the coach-athlete-parent triad may play a significant role in the development of FF (Elliot & Thrash, 2004; Jowett & Wylleman, 2006; Pankhurst et al., 2013; Sagar & Jowett, 2015; Sagar & Lavallee, 2010; Wylleman, 2000).

Accordingly, research by Sagar and Lavallee (2010) reported that parental practices contributed to the development of FF in young athletes through parental punitive behaviours (e.g., criticism, punishment and threat), parental controlling behaviours, and parental high expectations (e.g., Dorsch, Smith, & Dotterer, 2016; Elliott & Drummond, 2015). In line with Conroy's multidimensional model of FF (Conroy, 2001; Conroy et al., 2002), each of these parental behaviours can be perceived as aversive consequences to failure and, as a result of the threat appraisal process, FF in young athletes can be transferred and developed. Interestingly, a parent's anxieties around their own FF can also contribute to the development of a child's FF, whereby the child's failure is interpreted to reflect negatively on the parent's own perceived competence (Elliot & Thrash, 2004; Mills et al., 2007), thus in turn eliciting shame and provoking punitive and controlling behaviours in the parent (Sagar & Lavallee, 2010). Conversely, athletes high in FF were shown to demonstrate lower levels of FF (assessed through the Performance Failure Appraisal Inventory (PFAI); Conroy et al., 2002) following cognitive behavioural therapy-based interventions involving both parents and

athletes, suggesting that parents may also play a facilitative role in mitigating the impact of FF (Sagar & Lavallee, 2010). As such, the management of parental behaviours may provide a useful tool in preventing the development of FF in young athletes.

Along with parents, coaches also carry valued social evaluations, sometimes acting as 'gatekeepers' and decision makers regarding selection processes. As FF in young athletes is rooted in affiliation issues (McGregor & Elliot, 2005), the impact of such significant others on FF is a line of enquiry in need of further attention. Indeed, youth athletes' perceptions of their coaches have already been shown to directly and indirectly relate to the acute socialisation of FF (Conroy & Coatsworth, 2007). Building upon the evidence regarding the intergenerational transfer of FF (Elliot & Thrash, 2004; Sagar & Lavallee, 2010), it seems highly probable that the same mechanisms would underpin the development of FF (including that of FF transfer) were coaches and talent development environments to employ similar punitive measures, controlling behaviours and excessively high expectations. Curiously, such an approach has been advocated in recent literature as a method of developing mental toughness in youth sports (see Bell, Hardy, & Beattie, 2013; Hardy, Bell, & Beattie, 2013) although this was, rather confusingly, described as 'transformational punishment'. Although there is undoubtedly a need for persistence-type constructs such as resilience, grit and commitment in youth sport (Duckworth et al., 2007; MacNamara, 2011; Sarkar & Fletcher, 2014), we argue that defining mental toughness as an insensitivity to reward and a sensitivity to punishment (cf. Bell et al., 2013) is both counterintuitive and counterproductive when dealing with developing athletes. Those athletes who are highly sensitive to punishment may indeed detect threat early (as per Hardy et al., 2013), but the subsequent threat appraisal and association with the aversive consequences (i.e., the punishment) is in fact – given the mechanisms discussed earlier – an ideal climate for developing FF, which has in turn been shown to be

counterproductive to the development of talent (Appleton & Hill, 2012; Poczwardowski & Conroy, 2002; Sagar, 2009).

Outside of the coach-athlete-parent triad proposed by Wylleman (2000), a key social influence within any talent development environment is that of an athlete's peers. This influence is heightened around adolescence, as young individuals seek to decrease levels of parental relatedness and establish their own identity through greater autonomy and peer relatedness (Bruner, Boardley, & Côté, 2014; Hutman, Konieczna, Kerner, Armstrong, & Fitzpatrick, 2012; Inguglia, Ingoglia, Liga, Lo Coco, & Lo Cricchio, 2014; Wagner, 1996). As a result, the need to establish themselves within their peer group can lead to concerns around social evaluation and self-worth. Given the key constructs that underpin the multidimensional model of FF proposed by Conroy et al. (2002) – namely fear of an uncertain future, fear of devaluing self-estimate, fear of shame and embarrassment, fear of upsetting important others and fear of important others losing interest – it is reasonable to assert that such conditions could potentially facilitate the development of FF.

5.4 Addressing Fear of Failure in Talent Development Environments

So having identified the causative mechanisms behind FF and its potential impact on the talent development process, the next logical question is how can we mitigate its negative impact and potentially capitalise on its positive aspects? In doing so, we propose three key areas for attention: identification, self-regulative strategies, and managing the athletes' environment. Of course, as the development of FF is highly individualised due to the aggregation of personal experiences (Conroy & Elliot, 2004; Sagar & Jowett, 2012), any strategy that attempts to address FF needs to be tailored to the individual. Consequently, there is a need for screening and identification of individuals with high levels of FF and, ideally, across which dimensions these pertain;

thus enabling any intervention to be designed to meet the athlete's needs. The performance failure appraisal inventory (PFAI; Conroy et al., 2002) is one such tool that provides a quantifiable measure of FF across the five established domains, and has been validated in both North American and British sport settings (Conroy et al., 2002; Sagar & Jowett, 2010). However, the age range of the participants in these studies (i.e., 16+ years) only partially reflects that of many talent development programs (i.e., 11-21 years of age), especially for certain sports such as gymnastics. As such, there is a need for further validation of the PFAI within a talent development setting, or the development of an alternative, talent development-specific assessment tool.

The second potential area for impact is around the threat appraisal process itself, a point at which the applied sport psychology practitioner can add a great deal of value. In particular, the development and deployment of self-regulatory strategies such as metacognition can allow an individual to better control their thoughts, feelings and behaviours in order to adapt to their social and physical environment (Bartels & Magun-Jackson, 2009; Toering et al., 2009; Vohs & Baumeister, 2004). Self-control – sometimes used interchangeably with self-regulation – can also be viewed as an effortful form of self-regulation, and is defined as an ability to adapt one's responses to achieve a desired state or outcome that would otherwise not occur naturally (Baumeister et al., 2007; Tangney et al., 2004; Toering & Jordet, 2015). Accordingly, recent research has identified that an athlete's self-control predicts their levels of FF, by acting as a self-regulatory strategy to diffuse both intrapersonal (e.g., issues around self-worth) and interpersonal (e.g., issues around social evaluation) dimensions of FF (Sagar & Jowett, 2015). In support of this, metacognitive strategies associated with self-regulation have been shown to be positively related to those with a high need to achieve, while FF is associated with a failure to metacognitively self-regulate (Bartels & Magun-Jackson, 2009). Applying self-regulative strategies to the threat appraisal

process would allow athletes to re-interpret perceived threats as less threatening, and therefore reduce the need for maladaptive defensive behaviours. In situations whereby the threat appraisal process *does* result in a fearful reaction, we would suggest that metacognitive strategies may perhaps enable an athlete who experiences FF to choose to adopt an adaptive maximum effort-type defensive behaviour over other more maladaptive options when faced with a perceived threat. In developing and deploying such self-regulatory strategies, athletes should be able to more effectively manage their fear response and threat appraisal process; in turn, providing them with a choice: to survive the talent development process by trying to avoid threatening situations and limit opportunity for interaction with their environment; or to thrive in it, by actively seeking and negotiating developmental challenge.

The final area for impact to reduce FF is that of the talent development environment itself; in particular, managing the socio-environmental issues associated with consequences of failure. As part of the threat appraisal process, it is these aversive consequences that are feared, not failure itself (Birney et al., 1969; Sagar et al., 2007). As such, an absence of aversive consequence should therefore lead to an absence of FF. Although a complete absence of aversive consequence within talent development is perhaps somewhat unrealistic given the association between failure and uncertainty around future events (e.g., performance failure's impact upon future selection), it follows that a reduction in both aversive consequences such as punishment and withdrawal of interest by significant others will then reduce FF levels within the athlete. With this reduced level of FF, the individual is therefore less likely to adopt a defensive behaviour strategy that is detrimental to their development, such as avoidance coping.

Of course, the purpose of talent development is to prepare athletes for the performance demands of elite sport, and aversive consequences to failure such as deselection, loss of earnings, media criticism and uncertainty around one's future are all

part of the elite performance environment. It therefore becomes apparent that the challenge for both the applied sport psychology practitioner and the coach is to find the balance between adequately preparing an athlete for these real-world problems and consequences, but *not* creating a climate of fear that will stifle development. Given that the development of FF is highly individualised (Conroy & Elliot, 2004; Sagar & Jowett, 2012), and that talent development environments often involve a number of athletes, finding this balance is no easy task. However, recent literature has proposed that such complexity can be addressed by practitioners and coaches through the application of a professional judgement and decision making framework (PJDM; see Abraham & Collins, 2011; Collins & Collins, 2015; Martindale & Collins, 2013). Through the careful consideration of intention for impact (Martindale & Collins, 2005), such an approach would facilitate the informed phasing in of aversive consequences to failure (e.g., coach punitive behaviour) over a period of time, with a view to finding the right balance for each individual athlete at the right time, thus mitigating the impact of FF on talent development.

5.5 Fear of Failure, Perfectionism, and other Dual-Effect Characteristics

As presented in Chapter 3, a range of behaviours along with FF were identified as being either adaptive or maladaptive, dependent upon context. Other such dual-effect behaviours included passion, perfectionism, and over-commitment, with each of these areas having received considerable research focus (e.g., Flett & Hewitt, 2005; Hetland et al., 2012; Stoeber, 2011; Vallerand et al., 2006). Given – by definition – the maladaptive aspect of each of these dual effect constructs, their effective management is crucial for effective talent development to occur. However, due to the nature of the analysis used within the Chapter 3 study, such behaviours were categorised based on the reporting coaches' own interpretations and associations with the given constructs. For

example, a coach may have attributed a certain set of behaviours to perfectionism, without necessarily being aware of the true underpinning motives. Such a consideration raises the issue of behavioural similarity between these dual effect constructs, potentially obfuscating effective case formulation. As such, this also warrants further investigation.

A growing body of research has both proposed a significant overlap and established a significant correlation between the associated dimensions of FF and perfectionism (perfectionistic strivings and perfectionistic concerns; Stoeber & Otto, 2006), with both constructs considering the evaluative role of others, the impact of shame and embarrassment and issues around self-worth (Conroy, Kaye, & Fifer, 2007; Kaye, Conroy, & Fifer, 2008; Sagar & Stoeber, 2009; Stoeber & Becker, 2008). Not only this, but both constructs are subject to intergenerational transmission and parental influence (Gustafsson et al., 2015; Sagar & Lavallee, 2010; Soenens et al., 2005), are mitigated through effective self-regulation (Rudolph, Flett, & Hewitt, 2007; Stoeber & Yang, 2010), and are deemed adaptive (in the context of effective development) as the result of a maximum effort-type behaviour. Despite such stark parallels, however, it is apparent that the supporting evidence has concentrated very much on the *what* and the *how* of this association, but has perhaps failed to adequately address arguably the most pertinent question of all; namely, *why*? Why do perfectionists behave the way they do?

The answer to such a question would likely be established through a qualitative investigation of athletes demonstrating high levels of perfectionism, and despite such a study being beyond the scope of this thesis, it would be a pertinent line of enquiry. However, drawing on the similarities and already-established relationships between FF and perfectionism, viewing perfectionism through the lens of FF may offer some explicative power. For example, perfectionism can be viewed as a form of psychological defence (Flett, Besser, & Hewitt, 2005), and as a consequence is likely to

be subject to a threat appraisal mechanism in much the same way as FF. Often considered as predominantly maladaptive, perfectionistic concerns can be defined as the pursuit of exacting standards imposed by significant others, perceived negative evaluation from others, and a discrepancy between expectation and one's performance (Jowett, Hill, Hall, & Curran, 2016). Consequently, external pressures to perform to exceedingly high standards, along with the perceived aversive consequences to not meeting these standards (in itself a form of failure) are, following a threat appraisal process, likely to result in maximum effort-type behaviours in order to increase the likelihood of meeting these standards (e.g., Hill & Curran, 2015).

Conversely, perfectionistic strivings, recognised as potentially more adaptive than perfectionistic concerns, emanate internally as opposed to the external nature of its more maladaptive counterpart. As the pursuit of self-imposed goals and standards, accompanied by harsh self-criticism (Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000; Jowett et al., 2016), adaptive behaviours associated with perfectionistic strivings may be based around the internalisation of an activity in one's identity – much in the same way as obsessive passion (Donahue et al., 2009; Vallerand et al., 2003) – and therefore predicated on the avoidance of threat to the individual's identity and self-worth. Given the perfectionist's propensity for "rigid and irrational thinking patterns" (Hill, 2016, p. 16), the deployment of such excessive, persistent, and intense behaviours as a result of a perceived threat makes intuitive sense. Accordingly, perceived threats across the multiple dimensions identified by Conroy and colleagues earlier (see section 5.2) in relation to FF could well offer an efficacious and parsimonious explanation for a range of dual effect characteristics.

5.6 Conclusion

Within the field of talent development, there is a need to not only understand the impact of positive behavioural characteristics, but also those that may inhibit development. As one such construct, FF has only recently received attention within sport, and presents an opportunity to seek to improve talent development processes through its effective management. By better understanding the mechanisms by which FF impacts upon the developmental interaction between the athlete and their environment, three key areas for impact have been identified whereby the coaches, psychologists, and development systems can potentially enhance the adaptive aspects and mitigate the maladaptive ones. These areas for impact are: the screening of athletes for FF to facilitate individualised interventions; the promotion of self-regulatory strategies targeted around the threat appraisal process; and adopting a PJDM approach to applying aversive consequences to failure, balancing the development of coping strategies for high pressure environments, without compromising developmental interaction. By addressing these key areas, when faced with perceived threats, athletes will be less likely to adopt avoidance-type strategies in a bid to survive within their environment, and will instead learn to embrace the challenges posed; ultimately thriving.

In line with the need for screening, there is an obvious need for an appropriate and valid screening tool, much like the PFAI, but targeted specifically at talent development across the whole pathway (i.e., developing athletes aged 9-21 years). Given the interpersonal component of FF, further research is also recommended around the roles of the different personnel commonly found within talent development environments, paying particular attention to coaches, peers and support staff. This would allow practitioners to better target interventions relating to important others and

social evaluations. Similarly, additional research around the impact of aversive consequences readily associated with talent development processes is suggested, especially on those with high levels of FF, as this would aid the strategic introduction of challenge. Finally, examination in to the qualitative aspects of dual effect characteristics such as perfectionism and obsessive passion would yield explicative power as to their relationships with FF.

6. THE STORY SO FAR… AND WHAT NEXT?

6.1 Introduction

Having reviewed the literature and conducted qualitative investigations in to the influence of psycho-behavioural characteristics on the development of talent, it is perhaps appropriate to now pause and consider the findings of these studies in the context of informing and improving practice. As stated from the off, the aim of this thesis to identify the key mechanisms that underpin effective development, and how they can be improved through informed practice. Accordingly, this chapter seeks to review and summate the findings of the thesis so far, and consider how these findings may be utilised in order to increase the efficacy of the talent development process.

6.2 Critical Features of Talent Development

Throughout Chapter 2, we identified a series of key features and mechanisms that are necessary in order for development to occur. Acknowledging the complexity of human systems, interaction with deliberate and targeted challenge over a long period of time was recognised as a fundamental requirement for development. Subsequent to this, a period of post-challenge optimisation has to occur, in order to respond and adapt to these new demands. The exact nature of any prescribed challenge is dependent upon far too many variables to be addressed as part of this thesis, such as the sport, stage of development, competence of the coach, available resources, current skill level, etc. However, negotiating the more general challenges ubiquitous to talent development, such as injuries, transitions, refining techniques and deselections (amongst others) can be considered.

6.2.1 Psycho-behavioural Characteristics

The characteristics identified in Chapters 2, 3, 4, and 5 can be seen to impact at either the challenge engagement and / or challenge response stage. Those characteristics that impact at the challenge engagement stage would either facilitate or mitigate effective engagement with, and persistence through, developmental challenge (e.g., commitment). Conversely, those features impacting at the challenge response stage would determine the individual's ability to respond and adapt effectively; the point at which development occurs (e.g., self-regulation). It is worth noting at this juncture that in the context of talent development, the relationship between challenge engagement and challenge response is symbiotic, with neither being more important than the other; without challenge there is nothing to stimulate adaptation, and without adaptation, there is no need to engage with challenge. Accordingly, based on the data presented in this thesis thus far, the range of psycho-behavioural characteristics recognised to impact upon the talent development process are presented in Table 6-1. At this point, despite the argument put forward earlier that resilience is a product of other behaviours and characteristics, a conscious decision has been made to include resilience as a construct in its own right. This is based upon the data presented in Chapter 3, as described by the participants, recognising the role social constructivism plays in the way that individuals interpret, describe and explain the world in which they live (Burr, 2015; Gergen, 1985).

Table 6-1. Summary of Key Constructs Identified as Impacting Upon Talent Development

Higher Order Theme	Construct	Rationale for Inclusion
Positive Characteristics	Resilience	Chapters 2 and 3 (e.g., Luthar et al., 2000; Sarkar & Fletcher, 2014)
	Self-regulation and self-control	Chapters 2 and 3 (e.g., Baumeister et al., 2007; Toering et al., 2009)
	Goal setting and self-reinforcement	Chapters 2 and 3 (e.g., Abbott & Collins, 2004; Elliot & Harackiewicz, 1994; Kreiner-Phillips & Orlick, 1993)
	Creating and using support networks	Chapter 3 (e.g., Dorsch et al., 2016; MacNamara & Collins, 2011)
	Support for long-term success	Chapters 3 and 4 (e.g., Gould et al., 2008; MacNamara et al., 2010a, 2010b)
	Realistic and controllable imagery	Chapter 2 (e.g., Driediger et al., 2006; Holmes & Collins, 2001)
	Focus and distraction control	Chapter 3 (e.g., MacNamara & Collins, 2011)
	Quality practice	Chapters 2 and 3 (e.g., Hambrick et al., 2014; Phillips et al., 2010)
	Realistic performance evaluation and attribution	Chapter 3 (e.g., MacNamara et al., 2010a, 2010b)
	Support from others to compete to my potential	Chapters 3 and 4 (e.g., Güllich & Emrich, 2006; Lu et al., 2016)

	Planning and organisation	Chapter 3 (e.g., Abbott & Collins, 2004; MacNamara et al., 2010a, 2010b)
	Commitment and role clarity	Chapter 3 (e.g., Scanlan et al., 2016)
Dual Effect Characteristics	Perfectionism	Chapters 3 and 5 (e.g., Hill & Curran, 2015; Stoeber, 2011)
	Passion	Chapters 3 and 5 (e.g., Donahue et al., 2009; Vallerand et al., 2003)
	Fear of failure	Chapters 3 and 5 (e.g., Birney et al., 1969; Sagar, 2009)
Negative Characteristics	Anxiety-type behaviours	Chapters 3 and 4 (e.g., Ginsburg, 2009; Grant et al., 2013)
	Depressive symptoms	Chapters 3 and 4 (e.g., Bianchi et al., 2015; Burns & Birrell, 2014)
	Eating disorders	Chapters 3 and 4 (e.g., Currie, 2010; Thompson & Sherman, 2010)
	Behavioural change	Chapter 4 (e.g., Hill et al., 2016)

Having identified the psychological constructs that need to be addressed in order to positively influence talent development efficacy (in essence, the *why*), the next logical step is to look at the *what* and the *how*. In considering the differential deployment of such skills (e.g., MacNamara et al., 2010b), the need for highly individualised challenge (e.g., Phillips et al., 2010), the complexity of human systems, and the non-linearity of emerging behaviours (e.g., Simonton, 1999), it becomes rapidly apparent that any intervention to promote such improvement must be done on an individual basis; the implementation of any 'one size fits all' programme will fail to sufficiently capture the inevitable nuances and subtleties. So if, as practitioners, coaches, and academics, we are required to develop interventions around a series of established constructs, yet the developmental requirements are recognised to differ between individuals, how do we know what is required for each person?

6.3 Assessing the Individual's Needs

In order to guide intervention, some form of formative assessment is required to identify any issues that may require attention and monitor their improvement. The requirement for such assessment of psycho-behavioural features within talent development is acknowledged in earlier chapters (see Chapters 3,4, and 5), and is further supported by the fact some governing agencies now explicitly stipulate that athletes *must* be psychologically profiled as part of their development programmes (as is the case with Category 1 football academies in England, under the Premier League's Elite Player Performance Plan). As the science of psychological assessment, psychometrics are regularly employed in the field of psychology in order to assess and measure a wide range of constructs, such as intelligence and creativity (Nunnally &

Bernstein, 1994; Oppenheim, 1992; Rust & Golombok, 2009), and therefore appropriately address this need.

Accordingly, there are a number of existing psychometric tools designed to measure many of the identified constructs. The most pertinent one in relation to this thesis is the Psychological Characteristics of Developing Excellence Questionnaire (PCDEQ; MacNamara & Collins, 2011); a 59 item, 6 factor questionnaire assessing a range of established PCDEs. The PCDEQ has been shown to offer criterion validity and ecological validity, in that it has demonstrated to accurately discriminate between poor and good developers in a wide range of talent development settings (MacNamara & Collins, 2011, 2013). Similarly, Toering et al. (2013) developed and validated a 3 factor, 22 item psychometric tool for the assessment of self-regulated learning in developing footballers. To assess perfectionism within a sport setting, multidimensional perfectionism scales the Frost-MPS and the Hewitt-MPS (Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991) were adapted and validated for developing athletes within a sport setting, resulting in the 34 item Sport-MPS (Dunn, Causgrove Dunn, & Syrotuik, 2002; Dunn et al., 2006). In a similar fashion, Conroy et al. (2002) initially developed the 25 item Performance Failure Appraisal Inventory (PFAI) to measure fear of failure in American college students, and has since been validated with British sports participants (Sagar & Jowett, 2010). However, despite this welcome validation, it failed to fully address the entire talent development age spectrum, with the youngest participants being 16 years of age. Notwithstanding this age difference, such tools offer great scope in the quest for an objective measure for specific constructs within this context. Outside of a talent development setting, several other psychometric tools have been developed to assess other constructs deemed pertinent to our findings. For example, Connor and Davidson (2003) devised a 25 item tool to assess resilience in clinical populations (the CD-RISC). Similarly, Fairburn and

Beglin's 28 item Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994, 2008), the 9 item Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001), and the 7 item Generalised Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006), have all been developed in clinical settings, yet may be relevant to talent development.

Considering this abundance of psychometric assessment tools, it would be tempting to administer each test in order to assess their respective constructs. However, a quick glance over the questionnaires mentioned above reveals in excess of 200 items; given that the 59 item PCDEQ was reported to take up to 30 minutes to complete (MacNamara & Collins, 2013), such a number of items would severely limit the practicality of any assessment. Moreover – and more pertinently – the lack of any validation within a talent development context for some of the questionnaires brings their utility into question. Given these concerns, there is a clear and obvious need for a comprehensive psychometric assessment tool that assesses the full range of psycho-behavioural characteristics (the good, the bad, and the complicated!), validated within a talent development context, and with practical utility. Accordingly, the remainder of this thesis is dedicated to the development of such a tool.

6.4 The Psychological Characteristics of Developing Excellence Questionnaire version 2

Building upon the work of MacNamara, Collins and colleagues (e.g., Abbott & Collins, 2004; Abbott et al., 2007; Collins & MacNamara, 2012; MacNamara et al., 2010a, 2010b; MacNamara & Collins, 2011, 2015), the aims of the subsequent chapters are threefold. First, in reviewing the findings of the thesis so far, the range of factors affecting talent development efficacy is acknowledged to transcend that of the current scope of the existing PCDEs. As such, these factors need to be incorporated into the

body of PCDE research, and the framework realigned where necessary (i.e., checked for overlapping constructs, redundancy, etc.). Second, the development of a psychometric assessment tool, designed to measure these constructs in a talent development setting, is to be conducted. The Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2)[1] will then be validated to ensure it offers ecological, content, and criterion validity.

Prior to developing and validating the PCDEQ2, it is important to establish the rationale for any key delimitations that may influence its efficacy. For the development of the original PCDEQ, MacNamara and colleagues (MacNamara et al., 2010a, 2010b; MacNamara & Collins, 2011) sought to examine the role of PCDEs in a variety of different contexts, including music, dance, and a range of different team and individual sports. Whilst this approach was able to empirically establish the use of a range of PCDEs in these varied development environments, such a broad focus may be unable to assess any nuances and subtle differences between domains. Indeed, the development of the PCDEQ was limited to team and individual sports, with marked differences between the two noted (MacNamara & Collins, 2013). Acknowledging these subtle differences, the decision to delimit the development of the PCDEQ2 to male, team sport academy environments was taken. This decision would serve to provide a much larger pool of participants for data collection than individual sports, and as a consequence, the final PCDEQ2 – once validated – would potentially be able to have an impact on a greater number of athletes. Concurrently, it also maintained a methodological consistency with Chapter 3, with the data generated that underpinned much of the construct identification, originating from its intended target domain. Accordingly, the

[1] Hopefully my original contribution to knowledge is somewhat greater than my original contribution to questionnaire titles.

sports of rugby union, football, and rugby league were approached to be part of this process.

7. INITIAL DEVELOPMENT AND VALIDATION OF THE PSYCHOLOGICAL CHARACTERISTICS OF DEVELOPING EXCELLENCE QUESTIONNAIRE VERSION 2 (PCDEQ2)

7.1 Introduction

In light of the data presented in Chapters 3 and 4, along with the critical examination of existing literature, it is apparent that the promotion of adaptive psychological characteristics such as PCDEs and the effective management of dual-effect and maladaptive characteristics is key to the successful negotiating of the pathway to excellence. To facilitate this management, some form of psychometrically sound assessment tool could provide coaches and support staff with valuable information around which to base effective interventions. Accordingly, the purpose of this study was to generate a formative assessment tool to guide coaching practice, in order to improve the effectiveness of talent development processes. Consequently, this chapter details the development and initial validation of the Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2); a follow-up version of the original PCDEQ (MacNamara & Collins, 2011) designed to not only assess the original range of PCDEs, but also the wider range of psychological characteristics that influence the talent development process both positively and negatively.

In line with recommendations around the development of new psychometric assessment tools (de Leeuw, Hox, & Dillman, 2008; Nunnally & Bernstein, 1994; Oppenheim, 1992; Rust & Golombok, 2009), this chapter is split into two sections; the

first section examines the process of item generation, establishing clear face and content validity across the items, while the second section seeks to explore the underlying factor structure and establish the reliability of the PCDEQ2.

7.2 Item Generation, Justification and Refinement

The purpose of this first phase of assessment tool development was to construct items that represented the operationalisation of the different characteristics identified in previous chapters. In order to establish clear construct validity and comprehensibility of the final items, the processes undertaken in the generation, justification and refinement of the items are detailed below.

7.2.1 Item Generation

The fundamental aim of the creation of an item pool is to "sample systematically all content that is potentially relevant to the target construct" (Clark & Watson, 1995, p. 311). Such a process is a crucial part of establishing the validity of an assessment tool, as failure to adequately sample comprehensively can lead to items that accurately reflect the intended construct to not be included. This is of particular importance, given that no amount of subsequent data analyses is likely to generate any missing items! Accordingly, it was important that each of the target constructs identified and reported in Chapters 3, 4 and 5 (and summated in Chapter 6) – including the original range of PCDEs – were sufficiently represented, given their influence on the talent development process. Similarly, it was important that the items were also representative of and relevant to the target demographic (Oppenheim, 1992); namely male developing athletes in team sport academy programmes, aged between 13 and 21 years. Given that such characteristics may be operationalised differently depending upon both the context and the individual (e.g., PCDEs; see MacNamara, 2011), it was important that the items

could be meaningfully interpreted to reflect their intended constructs, but weren't too specific as to be problematic given differing contexts and cultures.

In an attempt to improve the content validity, items within previously published and validated psychometric tools designed to measure specific constructs intended to feature in the PCDEQ2 were also examined. These tools included the Performance Failure Appraisal Inventory (Conroy et al., 2002), the Self-Control Scale (Tangney et al., 2004), the Sport Multidimensional Perfectionism Scale (Dunn et al., 2006), the Perfectionistic Self-Presentation Scale – Junior Form (Hewitt et al., 2011), the Patient Health Questionnaire (PHQ-9; Kroenke et al., 2001), the Generalised Anxiety Disorder questionnaire (GAD-7; Spitzer et al., 2006), and the Eating Disorder Examination Questionnaire (EDE-Q 6; Fairburn & Beglin, 2008). The initial item generation resulted in 182 items across 19 themes, incorporating all 59 items from the original PCDEQ.

7.2.2 Expert Panels

The initial list of 182 items was submitted to three independent expert panels, (n = 3, 2 and 2 respectively) and one individual expert review, all of whom had extensive applied and/or research experience within the field of talent development (Willis, 2005). The specific domains of expertise represented included applied talent development, research and questionnaire development in the field of sport psychology, teaching, coaching and clinical psychology, with each expert fully briefed on the aims and rationale that underpins the PCDEQ2. Each expert was invited to critically discuss each item in relation to its relevance, comprehensibility, face validity and content validity. In line with the recommendations put forward by Dunn and colleagues (Dunn, Bouffard, & Rogers, 1999), each expert rated each item on a scale of 1 ("not at all relevant") to 5 ("completely relevant"). The panels were also invited to comment on the phrasing of

each item, and to offer additional items if they deemed it appropriate. Items that scored 5 remained unaltered, whilst items scoring 4 or below were then discussed by the panel. Where consensus was reached on such items by each panel, amendments were made to the item. Where consensus could not be reached, the items were marked for deletion at the end of the expert panel process.

As a result of the first expert panel, 75 items were amended due to grammatical, comprehension and face validity issues. Following discussion amongst the expert panel and with consensus reached between all involved, 25 items were added to the questionnaire to ensure there remained an appropriate item-to-factor ratio for subsequent stages of analysis. 32 items were removed at this stage, including the complete removal of two factors ("Support for long-term success" and "Support from others to compete to my potential"). Despite their inclusion in the original PCDEQ, it was felt that these items focussed on the deployment of the skills – i.e., the extent to which the skills were self-deployed or supported externally – rather than the skills themselves. As their deployment relied upon an external factor often beyond the control of the athlete (i.e., the talent development environment), it was felt that the environmental component of these attributes did not align with the underpinning rationale behind the questionnaire and were therefore removed.

The second and third expert panels resulted in no additional items, and no items were removed at this point. However, the terminology used within 9 items were amended to aid clarity across the two panels (n = 3 and 6 respectively). The individual expert review paid particular attention to clinical issues associated with talent development (as well as an overall view). This final expert review resulted in the removal of 2 further items due to their lack of relevance, whilst three items were amended to better represent their respective constructs. The two deleted items were part of the original item generation phase and not additional items proposed by the first

expert panel. By the end of the expert panel phase, the PCDEQ2 consisted of 173 items, representing 17 factors (see Appendix F).

7.2.3 Cognitive Interviews

In line with the old adage "communication isn't about what *you* say, it's about what *they* hear", within the context of developing questionnaires it is important to not only determine the relevance of each item, but also to ensure that each item is successfully interpreted in the manner in which it was originally intended (Conrad & Blair, 1996). If items are misinterpreted or cause confusion, there is an increased risk of non-response, non-completion or inaccurate response; all of which can negatively impact upon subsequent statistical analyses and generalisation of findings (Drennan, 2003). In order to minimise the likelihood of such occurrences, front end processes should not only address issues around item justification (as in the case of the expert panels), but also examine the respondents' cognitive processes to ensure appropriate levels of comprehension.

As one such front-end process, cognitive interviewing is designed to uncover respondents' thought processes when answering a survey question, in a bid to identify problems within the survey and generate potential solutions (Willis, 2005). Despite it being acknowledged that there is still an air of ambiguity around cognitive interview best practice (Drennan, 2003), researchers suggest using a combination of techniques to determine the cognitive processes involved and to identify potential response problems. Such techniques include think-aloud procedures, probes, behavioural observations, and paraphrasing questionnaire items (Beatty & Willis, 2007; Campanelli, 2008; Conrad & Blair, 1996; Willis, 2005; Willis, Schechter, & Whitaker, 1999), and have been utilised to good effect in recent talent development literature (e.g., MacNamara & Collins, 2011)

As part of a think-aloud procedure, participants are required to vocalise their thoughts and feelings when answering a survey question. These verbal reports are subsequently understood to demonstrate the participants' cognitive processes, and can occur either concurrently (i.e., at the time of answering) or retrospectively, often as part of a debrief (Campanelli, 2008). Unlike retrospective think-aloud techniques, concurrent think-aloud procedures are not susceptible to recall issues, and therefore may potentially offer greater validity. However, concurrent thinking aloud is not a typical everyday activity; respondents can frequently require neutral probes to encourage them to vocalise their thoughts effectively, potentially impacting upon the flow of the questionnaire. Conversely, retrospective thinking aloud is recognised as less burdensome for the respondent (Beatty & Willis, 2007; Campanelli, 2008; Mehrotra, 2007).

A potential issue with using think aloud protocols in the development of the PCDEQ2 lies within its target demographic; namely developing athletes. Young people are often recognised to have difficulties in articulating their thoughts and feelings, and may perceive words differently to adults (Drennan, 2003), thus making the think-aloud protocol problematic. In recognition of such issues, the deployment of retrospective verbal probing can be used. Campanelli (2008) suggest that in order to ascertain the cognitive processes behind the responses, probes should address issues around comprehension, recall, judgement and response. Requesting respondents to paraphrase questions in their own words, asking them to define meanings of key words within questions, explain their responses and identifying areas that they found problematic are all ways of eliciting a respondent's understanding of a question (Czaja, 1998; Drennan, 2003). As well as such pre-scripted probes, unscripted probes offer an opportunity to explore unexpected responses (Conrad & Blair, 1996). Behavioural observations can often act as a prompt for such probes, with behaviours such as skipping questions,

changes in facial expression, hesitation in answering, and changing answers all offering further lines of enquiry (Conrad & Blair, 1996; Drennan, 2003; Willis, 2005).

In analysing the data generated through cognitive interviewing, Conrad and Blair (1996) propose that response problems to questionnaire items can be categorised in to five different types: lexical, temporal, logical, computational, and omission/inclusion issues; and any of these issues can occur at each stage of the response process, namely understanding, task performance and response formatting. *Lexical problems* are those based around the participant not knowing the meaning of a word or how to use it correctly. This extends to idioms (e.g., "elbow grease") and unfamiliar word pairings (e.g., "monkey tennis"), and can occur if, for example, the respondent is unsure as to a particular meaning of a category label. This is particularly pertinent to this study, in ensuring that the items are not beyond the understanding or vocabulary of the target demographic (Dillman, 2007). As a special case of lexical problem, *temporal problems* involve respondents struggling to understand or operationalise terms relating to time. To illustrate such an issue, Conrad and Blair (1996) offer the example of the phrase "in the last year", a phrase that could be interpreted as meaning the last twelve months or the last calendar year. *Inclusion / exclusion* problems arise when it cannot be determined if certain concepts are to be considered in relation to the word in question, and can often lead to respondents providing multiple or incorrect responses (Drennan, 2003). *Logical problems* arise in relation to presuppositions, contradictions, and connecting words such as "and" or "or", and can lead to respondents having to answer two (or more) questions in one (Conrad & Blair, 1996; Drennan, 2003). Finally, *computational problems* often involve memory, mental arithmetic and language processing, but as all of the issues discussed above in one way or another, this category serves as a catch-all for all issues that don't fit in to the previous four (Conrad & Blair, 1996).

7.2.3.1 Participants. Individual cognitive interviews were conducted with six purposively sampled developing athletes from football and rugby union academies (*n* = 4 and *n* = 2 respectively), with two athletes aged 14-16 years, two aged 17-18 years, and two aged 19-20 years old; thus representing the intended demographic of the questionnaire, and representative of the environments from which the items were developed. Although such limited numbers cannot guarantee the comprehensive identification of potential problems relating to questionnaire design (Beatty & Willis, 2007; Blair, Conrad, Ackermann, & Claxton, 2006), given the lack of consensus around appropriate sample size in cognitive interviewing (Conrad & Blair, 1996) and that the cognitive interview process is in essence a qualitative exercise and not a quantitative one (i.e., logical and structural problems persist independent of sample size; Willis, 2005), the use of a small, high quality sample that reflected the sub-populations of the final questionnaire's target demographic was deemed appropriate.

7.2.3.2 Procedure. The randomised items were split across 16 sections and administered to participants on a section-by-section basis, with breaks between sections in order to minimise both participant and investigator fatigue. In line with the recommendations of Willis and colleagues (Beatty & Willis, 2007; Willis, 2005; Willis et al., 1999), a combination of proactive and reactive verbal probing was utilised, including think-aloud protocols, reinterpretations, and observations (see Appendix G). Following the completion of each section, respondents were also invited to comment upon their answers and underpinning rationales. Observations noted included hesitations, changing answers, skipping questions and behavioural indicators (e.g., head scratching and fidgeting), and were recorded along with the probe responses.

7.2.3.4 Results. Following the completion of the cognitive interview process, comments for each item were collated and categorised according to Conrad and Blair's (1996) taxonomy. This process resulted in the amendment of 9 items (items 14, 26, 28,

38, 77, 91, 93, 117, 134) due to lexical problems (e.g., not knowing what was meant by "iron self-discipline") and 1 item (item 76) due to temporal issues ("I am happy with how my body looks" failed to recognise the transformational nature of talent development). No items were removed at this point in the process.

7.2.4 Pilot Test

As the final stage in the front end testing, a pilot test was conducted using the 173-item PCDEQ2. The pilot offers a 'dress-rehearsal' of the full questionnaire under real survey conditions, but with smaller numbers than the intended final dataset. Unlike the previous two procedures, the pilot study is not aimed at establishing the viability of individual items, but rather assuring the smooth coordination of procedures and survey routines (Campanelli, 2008). A pilot study also offers the opportunity to examine the discriminative nature of the data it produces; an important consideration given the subsequent intended analyses.

7.2.4.1 Participants. Participants for the pilot study were purposively selected from elite football (n = 38) and rugby union academies (n = 25). All 63 participants were male, and ages ranged from 14 – 20 years old (M = 16.35; SD = 1.536), reflecting the intended target demographic of the final questionnaire.

7.2.4.2 Procedure. Ethical approval was sought from the University's research ethics committee (see Appendix E). Informed consent was gained from all participants over 16 years of age, and informed parental assent was obtained for participants below the age of 16. The PCDEQ2 consisted of 173 statement items, with similarity responses marked on a 6-point Likert scale from 1 ("very unlike me") to 6 ("very like me"). As with the original PCDEQ, the adoption of a 6-point Likert scale ensures that participants were unable to give a neutral answer, therefore encouraging them to carefully consider whether they agree or disagree and leading to greater precision (Chang, 1994). A

combination of positively framed (n = 129) and negatively framed (n = 44) items were used in an attempt to minimise acquiescence bias (Danner, Aichholzer, & Rammstedt, 2015). The questionnaire was administered electronically using Apple iPad tablets to access the Survey Monkey website, where the 173 item PCDEQ2 had been set up. This format ensured that no items were omitted by the participants, therefore rendering any dataset incomplete. The questionnaire took between 40 and 55 minutes to complete, and incorporated an optional break halfway through to help prevent participant fatigue. Following a short debrief, participants were encouraged to comment upon each item's comprehensibility, similarity and relevance.

7.2.4.3 Data analysis. As the purpose of the PCDEQ2 was to differentiate the respondents according to the characteristics being measured (MacNamara & Collins, 2011), analysis of the facility and discrimination of each item was undertaken. The facility index was used in order to measure the extent to which items were answered in the same way and therefore did not discriminate, and was conducted in line with the recommendations of Rust and Golombok (2009). Items that scored approaching or equal to either of the extreme scores were subsequently disregarded due to their limited differentiation. Care was also taken to ensure that items whose scores fell within the accepted range also displayed adequate deviation from the item's mean score. As the extreme scores all displayed standard deviations of less than 1.00, this was taken as the threshold for all other items to ensure adequate variability in response and to further support the PCDEQ2's use as a discriminative tool.

7.2.4.4 Results. Following the analysis of the pilot study data and the subsequent removal of those items deemed not to be discriminative as described above, the questionnaire was reduced to 135 items, with each of the 17 higher-order constructs represented by at least four items. This was particularly important given that the next

stage of the questionnaire's development and analysis would require multiple items for each construct. For a full list of the 135-item PCDEQ2, please refer to Appendix H.

7.3 Establishing the Factor Structure

Following on from the front-end processes centred around item generation, justification and content validity, the second phase of the development of the PCDEQ2 was to determine the underpinning latent factor structure. Accordingly, an exploratory factor analysis (EFA) was undertaken using the Statistical Package for the Social Sciences (SPSS) version 22, in order to determine the underpinning latent factor structure of the PCDEQ2, allowing important items to be retained and analysed.

7.3.1 Exploratory Factor Analysis

EFA is a complex procedure, with a great number of options and very few absolute guidelines. Consequently, careful consideration must be given to each decision made and the reasoning behind it. Curiously, however, in a survey of a two-year period investigating over 1700 studies using some form of EFA, Costello and Osborne (2005) noted a distinct lack of methodological variation, with well over half using principal components analysis with varimax rotation. Indeed, of those researchers reporting their criteria for deciding the number of factors to be retained, the majority stated using the Kaiser criterion. While this may be appropriate for some studies, it will not always yield the best results for a given data set (Field, 2005). Such findings highlight the potential danger of solely seeking precedent in the literature without an appropriate rationale. As such, this section aims to lay out the underpinning rationales behind the methodological decisions made.

7.3.1.1 Extraction and rotation methods. Despite principal components analysis (PCA) being widely adopted in the literature, it is not actually a true method of factor

analysis; it is in fact only a data reduction method (Fabrigar & Wegener, 2012) in that it is "computed without regard to any underlying structure caused by latent variables" (Costello & Osborne, 2005, p. 2). Conversely, the aim of factor analysis is to identify any latent variables that cause the manifest variables to covary, whilst eliminating measurement error (Henson, Capraro, & Capraro, 2004). Based on discussions in previous chapters, it is perhaps reasonable to assume there would be latent factors in the 135-item PCDEQ2, given the established association between different featured constructs (e.g., fear of failure and perfectionism, or goal setting and self-regulation; see Chapter 3). Furthermore, unlike PCA that uses all the variance of the manifest variables, factor analysis separates the shared variance of a variable from its unique variance and error variance, with only the shared variance considered for analysis (Tabachnick & Fidell, 2014). Such a distinction can leave PCA susceptible to over-inflating relationships as result of incorporating both shared and unique variance in a set of variables (Costello & Osborne, 2005; Field, 2005). Further support for discounting PCA in favour of factor analysis can be found in Tabachnick and Fidell's (2014) suggestion that factor analysis is appropriate when the research is underpinned by theoretical and empirical predictions, such as those presented in Chapters 3-6.

In determining the appropriate method of factor extraction, information on the comparative benefits of different methods is both scarce and confusing (Costello & Osborne, 2005). Fabrigar, Wegener, MacCallum, and Strahan (1999) propose that if the data is normally distributed, maximum likelihood (ML) factor extraction is the best choice. If the normality of the data is violated, however, they recommend adopting principal axis factor (PAF) extraction. In the case of the PCDEQ2, as the data has been collected from a homogenous group from within a wider population (i.e., developing elite athletes from a wider population of adolescents), who are typically characterised as

highly driven and highly talented[1] individuals, the data were highly unlikely to be normally distributed. As such, PAF extraction was employed in an attempt to determine a more parsimonious factor structure for the PCDEQ2.

In an attempt to clarify and simplify the data structure, rotation was employed to improve the interpretation of the factor structure. As the factors were assumed to be correlated given the established associations between constructs described earlier and that "behaviour is rarely partitioned into neat little units" (Costello & Osborne, 2005, p. 3), oblique rotation was chosen rather than orthogonal rotation. As orthogonal rotation produces factors that are uncorrelated (Tabachnick & Fidell, 2014), using it in this context could result in the loss of valuable information due to oversimplification, with oblique rotation theoretically rendering a more accurate solution (Costello & Osborne, 2005). Given that there is no widely preferred method of oblique rotation, and that all tend to produce similar results (Fabrigar et al., 1999), a direct Oblimin rotation with Kaiser Normalisation was selected (Fabrigar & Wegener, 2012; Field, 2005; Pallant, 2013), being a standardised option within SPSS. The default delta value of 0 was used in order to standardise the process (Costello & Osborne, 2005).

7.3.1.2 Determining sample size. The reliability of factor analysis is reliant on the appropriateness of its sample size, as correlation coefficients tend to be less reliable when estimated from small samples (Tabachnick & Fidell, 2014). However, as with seemingly most things related to EFA, rules pertaining to sample size are varied. For example, Comrey and Lee (1992) propose absolute values, with 100 being a poor sample size, 300 as good, and 1000 as excellent, whilst other researchers propose various participant-to-item ratios. Widely recognised as a general rule of thumb is a ratio of 10 participants to 1 item (Nunnally & Bernstein, 1994), while Kass and Tinsley

[1] In the general, everyday sense of the word.

(1979) suggest ratios of between 5 and 10 participants per variable, up to a total of 300 participants, at which point test parameters tend to be stable regardless of the ratio.

Rather than generate hard and fast rules relating to sample size, more recent literature has noted that such heuristics can lead to overestimates of required sample size, as they do not take in to consideration the quality of the data (Fabrigar & Wegener, 2012). Instead, MacCallum, Widaman, Zhang, and Hong (1999) have shown that as communalities within the data become lower, the importance of sample size increases. With all communalities above 0.7, and 3-5 measured variables loading on to each factor, sample sizes of less than 100 may be perfectly adequate; with communalities between 0.4 and 0.7, 200 participants may suffice; and under poor or worst-case conditions (i.e., communalities below 0.4 and some factors with only 2 measured variables), samples of at least 500 might be necessary (Fabrigar & Wegener, 2012; Fabrigar et al., 1999; MacCallum et al., 1999; Tabachnick & Fidell, 2014).

Unfortunately, the quality of the data can only really be assessed once it has been collated, thus making guidelines for sample size based on communalities somewhat problematic! With this in mind, Fabrigar and Wegener (2012) recommend planning for moderately good data , given that optimal conditions may be hard to achieve. As such, a decision was made to err on the side of caution when establishing the sample size for this study, allowing for poor conditions (but assuming moderately good ones, given the theoretical underpinning) with a target of around 500 participants. As the PCDEQ2 currently contains 135 items, a sample of around 500 participants would yield an item to participant ratio of approximately 4:1.

The Kaiser-Meyer-Olkin of sampling adequacy (KMO; Kaiser, 1970; Kaiser, 1974) offers another assessment of suitability for factor analysis, representing the ratio of the squared correlation between variables to the squared partial correlation between variables (Field, 2005). The KMO scores a value between 0 and 1, with a value near 1

indicating that factor analysis should yield distinct and reliable factors. Values below 0.5 suggest factor analysis is not appropriate, between 0.5 and 0.7 are mediocre, values between 0.7 and 0.8 are good, between 0.8 and 0.9 very good, and values above 0.9 are superb (Hutcheson & Sofroniou, 1999). To test for an adequate level of correlation between items, Bartlett's (1954) test of sphericity was used. Given that this is a highly sensitive test, large samples can return a significant result even if correlations are very low; therefore the test is only recommended for use only if the participant to item ratio is less than 5 (Tabachnick & Fidell, 2014). Given that the anticipated ratio would be approximately 4 to 1, both the KMO and Bartlett's test of sphericity were utilised in determining the data's suitability for factor analysis.

7.3.1.3 Retaining and interpreting factors. Having determined the extraction and rotation methods, the next decision is how many factors to extract for rotation, as both over-extraction and under-extraction can have a significant impact upon the results (Costello & Osborne, 2005). Despite being widely adopted in the literature, the Kaiser criterion – whereby all factors with an eigenvalue of greater than 1.0 are retained – has actually been deemed one of the *least* accurate methods for determining the numbers of factors to be retained (Velicer & Jackson, 1990), often resulting in substantial over-factoring (Fabrigar & Wegener, 2012). Another widely adopted method is the scree plot (Cattell, 1966), whereby a graphical representation of each common factors' eigenvalues are plotted to subjectively determine the number of factors to be extracted, yet researchers suggest caution when this is used in isolation (Fabrigar et al., 1999).

Parallel analysis is another method used to determine the number of factors to extract. In this case, the size of the eigenvalues from the extraction are compared with those obtained from a randomly generated equivalent data set (Field, 2005; Pallant, 2013), with only those factors whose eigenvalues exceed the eigenvalues of the random data set being retained. Parallel analysis has been demonstrated to be more accurate

than both the Kaiser criterion and the scree plot, with the latter two methods showing a tendency to overestimate the number of factors (Velicer & Jackson, 1990). In this regard, Costello and Osborne (2005) suggest running multiple analyses stipulating different numbers of factors based on information from other tests (e.g., the scree plot) and comparing the item loading tables. The aim in this case would be to identify the "cleanest" factor structure, i.e., items loading above 0.30, no or few cross-loading items and no factors with fewer than 3 items, which would therefore have the best fit to the data.

In an attempt to identify the factor structure that best explained the data within this study, a combination of Kaisers criterion, the scree plot, and parallel analysis were all considered, with the resultant suggested number of factors analysed in an attempt to find the cleanest factor structure. From this point, the wording of the highest loading items within each factor would be considered when interpreting the factors.

7.3.1.4 Internal consistency. In order to establish the internal consistency of the PCDEQ2, Cronbach's alpha coefficients were calculated for each factor, with each factor requiring a score of 0.7 or greater (DeVellis, 2012). Item-total correlations were used to assess the reliability of each sub-scale, ensuring that each item correlated more with their intended subscale than any other. A low value here (below 0.3) would indicate that the item is measuring something other than the intended scale (Pallant, 2013). Inter-item correlations were examined to ensure that they correlated positively with their assigned subscale, thus ensuring an accurate Cronbach's alpha.

7.3.2 Procedure

Ethical approval for this study was obtained from the University's ethics committee (see Appendix E), and a range of top level football, rugby union and rugby league academies were invited to be part of the research. Project information sheets,

along with athlete and parental (where the participant was under 16 years of age) consent forms were distributed to participants. Data collection took place at the participants' primary training location, and those with completed consent forms were asked to complete the questionnaire under the supervision of myself. Confidentiality was assured throughout the process, with a key emphasis placed on answering as openly and as honestly as possible. Participants were also reminded that the purpose of the study was not to test them as individuals, but for them to help test the questionnaire.

7.3.2.1 Participants. 512 participants, aged between 13 and 21 years of age[2] (M = 15.54, SD ± 1.377), were purposively recruited from elite rugby union (*n* = 252), football (*n* = 141), and rugby league (*n* = 119) academies to participate in the study. The participants represented the intended target demographic of the final questionnaire, i.e., male adolescents enrolled in talent development systems aiming to make the transition to elite team sports. All participants were members of representative squads, competing at either regional, national or international level. Furthermore, the participants were all drawn from environments typical of those characterised in the research that underpins the PCDEQ2's development, as discussed in Chapter 2.

7.3.2.2 Questionnaire format. The 135-item version of the PCDEQ2 was administered both electronically using Apple iPads to access the Survey Monkey website, and as a paper-based version. The paper-based version was an identical printout of the electronic version, and where this was employed, the data were transferred to the Survey Monkey website following collection. The decision to administer the PCDEQ2 in both electronic and paper form was a purely pragmatic one,

[2] As data were collected over the period of several months from August 2015 through to April 2016, the participants' dates of birth were used to calculate their age on the 1st September 2016. This date was deemed appropriate as it is used as the cut-off point for new seasons in each of the respective sport's age-group programmes (i.e., if a child is 15 on the 1st of September, they will compete in the Under 16s age group).

as limited access to large numbers of tablet devices, along with technical issues such as intermittent signal strength would, from time to time, impact on the efficacy of electronic data collection. Accordingly, the paper-based version was primarily utilised as a back-up method. The PCDEQ2 was preceded by an instruction page on both versions, asking participants to rank each statement as to how well it applied to them. Following this, each participant was required to enter a unique identification code, including information pertaining to the participant's club, their initials, and their date of birth. This would then allow the matching up of further predictive data garnered at a later date for the subsequent study (see Chapter 8), to the individual's PCDEQ2 data from this study. Within the questionnaire, each item was scored on a 6 point Likert scale, from 1 ("very unlike me") to 6 ("very like me"). Of the 135 items within the PCDEQ2, 40 items were negatively worded, to avoid acquiescence bias. The scores for these items were subsequently amended so that the highest score reflected the strongest relationship to its intended construct. Prior to administering the questionnaire, all 135 items were randomised to minimise any possible bias brought about by successive items relating to the same construct appearing together.

7.3.3 Data Analysis

Using SPSS, an EFA was conducted on the data using PAF extraction with a direct Oblimin rotation. To ensure that this method was indeed appropriate, an examination of the factor correlation matrix (see Table 7-1) was conducted. This revealed moderate correlations between Factors 1 and 2 (0.352), Factors 1 and 3 (0.252), Factors 1 and 7 (-0.346), Factors 5 and 6 (0.268), and Factors 5 and 7 (0.263). Given the correlation between these factors, PAF with direct Oblimin rotation was deemed an appropriate extraction method.

Table 7-1. Factor Correlation Matrix

Factor	1	2	3	4	5	6	7
1	1.000	0.352	0.252	0.051	-0.105	-0.143	-0.346
2	0.352	1.000	0.079	0.219	0.181	0.048	-0.211
3	0.252	0.079	1.000	0.025	-0.228	-0.214	-0.186
4	0.051	0.219	0.025	1.000	0.194	0.165	0.114
5	-0.105	0.181	-0.228	0.194	1.000	0.268	0.263
6	-0.143	0.048	-0.214	0.165	0.268	1.000	0.199
7	-0.346	-0.211	-0.186	0.114	0.263	0.199	1.000

7.3.3.1 Sampling adequacy. The Kaiser Myer Olkin measure of sampling adequacy showed that the sample size was sufficient for factor analysis (KMO = 0.870). Bartlett's test of sphericity was also significant ($\chi^2 = 29130.531$; df = 9045; p = 0.000), suggesting that there was adequate correlation between the variables and that EFA was therefore appropriate.

7.3.3.2 Factor extraction. Given that the item communalities ranged from 0.280 to 0.703 (M = 0.519), multiple criteria for factor extraction would be required. Examination of the Kaiser criterion revealed no fewer than 38 factors with eigenvalues greater than 1. However, this is recognised as one of the least accurate methods of extraction due to its tendency to overestimate the number of factors as a result of inherent assumptions, and is conceptually better suited to principal components analysis (Fabrigar & Wegener, 2012; Russell, 2002; Velicer & Jackson, 1990). Moreover, a 38-factor solution lacked a theoretical underpinning when set against the qualitative studies in Chapters 3 and 4, whilst the interpretation of such a structure would have proved very problematic. As an alternative method, a scree plot is acknowledged as a reasonably accurate indication of the number of factors (Fabrigar et al., 1999; Russell, 2002). Perhaps unsurprisingly, visual inspection of the scree plot (see Figure 7-1) yielded very different results, suggesting between 6 and 10 factors.

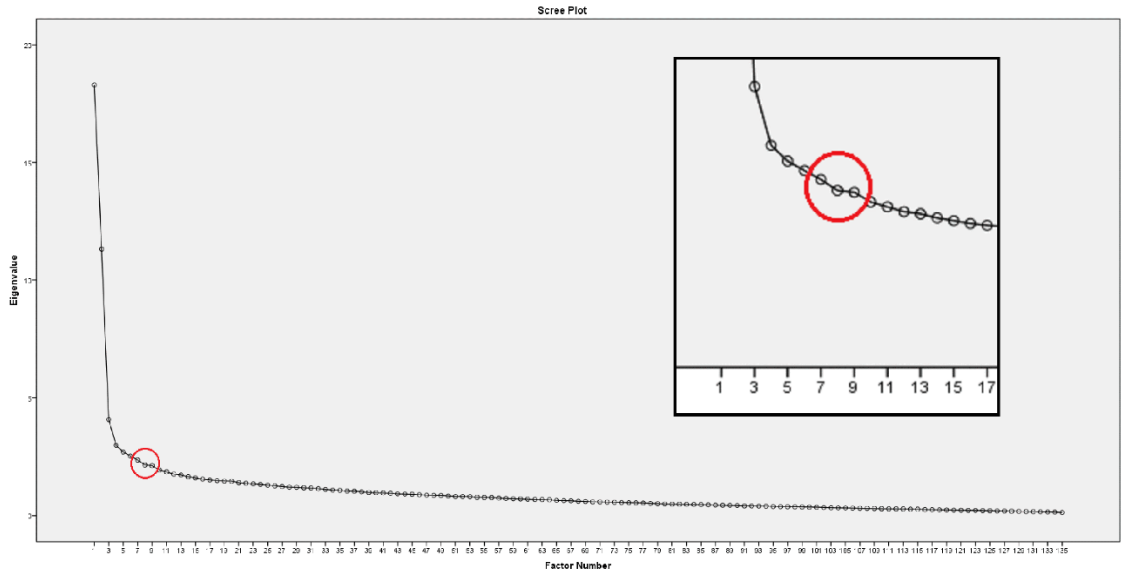

Figure 7-1. Scree Plot

As a further measure to ascertain the appropriate number of factors to extract, parallel analysis was undertaken. Parallel analysis (Horn, 1965) is widely acknowledged as the most accurate method for determining the number of factors following EFA (Costello & Osborne, 2005; Henson et al., 2004; Pallant, 2013; Tabachnick & Fidell, 2014), and compares eigenvalues from the EFA to those of randomly generated data for an equivalent sample size. Accordingly, parallel analysis against an equivalent random dataset (i.e., 135 items, 512 participants) suggested adopting a 10-factor structure (see Table 7-2).

Table 7-2. Parallel Analysis

Component Number	Actual Eigenvalue from PAF	Random Eigenvalue from Parallel Analysis	Decision
1	18.292	2.2302	Accept
2	11.315	2.1328	Accept
3	4.073	2.1140	Accept
4	2.984	2.0763	Accept
5	2.696	2.0329	Accept
6	2.522	1.9971	Accept
7	2.358	1.9671	Accept
8	2.150	1.9352	Accept
9	2.117	1.9059	Accept
10	1.938	1.8757	Accept
11	1.848	1.8481	Reject

Although the original findings in previous chapters identified 17 higher order constructs impacting upon talent development, data from the current EFA did not support this. Accordingly, further analyses were conducted, examining 6-, 7-, 8-, 9-, and 10-factor solutions to assess the suitability of the proposed solutions. As the objective of EFA is to arrive at a useful or appropriate number of common factors, reflecting both the statistical and conceptual utility (Fabrigar & Wegener, 2012), the factor structures of the proposed solutions were examined and compared in a bid to identify the most suitable solution, as both over-factoring and under-factoring can lead to substantial errors (Field, 2005). The criteria used were: items loading above 0.30; no or few cross-loading items; and no factor with less than three items.

Due to a combination of high number of cross-loadings and small numbers of items within factors, the 6-, 8-, 9-, and 10-factor solutions were discarded, with the 7-factor solution being retained for further analysis. Not only did this solution offer the most statistically sound results, but it also offered the most conceptually coherent structures. This 7-factor structure accounted for 32.8% of the total variance, with

eigenvalues ranging from 18.292 to 2.358. Factor loadings for the 7-factor solution ranged from 0.302 to 0.797 across the 7 factors.

7.3.3.3 Relationships between factors. Examinations of the both the pattern matrix and the structure matrix were conducted, as an oblique rotation was used (Henson et al., 2004; Pallant, 2013). The pattern matrix (see Table 7-3) identified the factor loadings of each item, whilst examination the structure matrix (see Table 7-4) highlighted any potential correlations between factors. Accordingly, this examination revealed a relationship between Factors 1, 2, 3, and 7, and a separate relationship between Factors 4, 5 and 6.

Table 7-3. 135-Item Pattern Matrix

	Factor						
	1	2	3	4	5	6	7
Q30	0.573						
Q37	0.543						
Q11	0.461						
Q36	0.456						
Q35	-0.372						
Q101	0.368		0.319				
Q110	0.347						
Q27	0.332						
Q117	0.324						
Q9	0.305						
Q123	-0.305						
Q103							
Q21							
Q119							
Q56							
Q32							
Q43							
Q50							
Q17							
Q135		0.797					
Q96		0.786					
Q58		0.716					
Q57		0.704					
Q82		0.659					
Q55		0.643					
Q12		0.586					
Q64		0.499					
Q67		0.496					
Q76		0.426					
Q65		0.413					
Q39		0.356					
Q118		0.355					
Q73		0.344					
Q121		0.323					
Q53							
Q22							
Q63							
Q52							

Q86	0.671	
Q18	0.660	
Q106	-0.502	
Q114	0.466	
Q102	0.454	
Q107	0.426	
Q108	0.422	
Q83	0.405	
Q120	0.401	
Q59	0.401	
Q126	0.398	
Q68	0.356	
Q105	0.339	
Q25	0.337	
Q24	-0.305	
Q98		
Q85		
Q29		
Q23		
Q116	0.511	
Q84	0.446	
Q7	0.418	
Q20	0.409	
Q92	0.399	
Q48	-0.374	
Q13	0.363	
Q28	0.355	
Q91	0.348	
Q132	0.324	
Q72		
Q5		
Q104		
Q89		
Q4		
Q38		
Q26		
Q60		
Q40		
Q112		0.663
Q19		0.587
Q10		-0.516

Q88	0.489	
Q16	0.482	
Q69	0.478	
Q75	-0.465	
Q122	-0.460	
Q74	-0.448	
Q31	0.445	
Q46	0.412	
Q115	-0.407	
Q8	-0.390	
Q54	0.370	
Q125	-0.366	
Q45	-0.364	
Q1	0.361	
Q66	0.354	
Q51	0.353	
Q90	0.335	
Q99	0.329	
Q134	0.308	
Q14		
Q15		
Q129		
Q97		
Q3		
Q128		0.420
Q133		0.418
Q87		0.389
Q33	-0.304	0.384
Q94		0.362
Q61		-0.331
Q42		0.330
Q62		0.323
Q80		0.323
Q130		0.317
Q79		-0.302
Q78		
Q124		
Q47		
Q131		-0.743
Q71		-0.649
Q109		-0.586

Q70	-0.537
Q34	-0.515
Q127	-0.509
Q81	-0.455
Q77	0.384
Q111	-0.365
Q93	-0.308
Q113	0.302
Q49	
Q95	
Q100	
Q44	
Q6	
Q2	
Q41	

Table 7-4. 135-Item Structure Matrix

	Factor						
	1	2	3	4	5	6	7
Q37	0.642						-0.403
Q30	0.619						-0.329
Q36	0.579	0.400					-0.304
Q110	0.539	0.308	0.324			-0.320	-0.432
Q101	0.525		0.456				-0.323
Q11	0.519						-0.301
Q119	0.492	0.344	0.354				-0.366
Q117	0.444	0.319					
Q103	0.424				-0.341	-0.304	-0.322
Q35	-0.412						
Q123	-0.406				0.331	0.307	0.376
Q21	0.382						
Q9	0.381					-0.337	
Q27	0.379						
Q38	0.358	0.318	0.323				
Q14	0.324			0.313			
Q56	0.315						
Q43	0.309						
Q17							
Q50							
Q32							
Q40							
Q135		0.741					
Q96		0.721					
Q58		0.687					
Q57		0.682					
Q82		0.614					
Q55		0.598					
Q64		0.575			0.316		
Q67		0.531					
Q65	0.302	0.518					
Q76	0.324	0.517		0.339			
Q12		0.500					
Q118	0.318	0.476					
Q73	0.451	0.474	0.328				-0.331
Q53	0.455	0.461	0.303				-0.340
Q39		0.431					
Q22		0.409			0.303		

Q63	0.317	0.398					
Q121		0.393					
Q100		0.348					
Q104		0.337		0.336			
Q52							
Q86			0.677				
Q18			0.653				
Q106			-0.537				
Q102	0.359	0.356	0.523				
Q114			0.516				
Q107	0.406	0.313	0.484				
Q108			0.472				
Q59			0.455				
Q85	0.443		0.452			-0.387	-0.356
Q83			0.436				
Q105	0.388		0.435				-0.358
Q120			0.429				
Q68			0.429				-0.304
Q126			0.427				
Q98	-0.338		-0.410			0.325	0.337
Q29	0.394		0.398		-0.311		-0.328
Q25			0.383				
Q79			0.364			-0.357	
Q24			-0.340				
Q23			-0.328				
Q116				0.559	0.353		
Q84				0.530	0.322		
Q20				0.462			
Q7				0.442	0.326		
Q92				0.442			
Q28				0.374			
Q91				0.371			
Q48				-0.370			
Q13				0.367			
Q132				0.344			
Q4							
Q72							
Q26							
Q60							
Q5							
Q89							

Q112				0.677		
Q19				0.629		
Q88				0.612	0.377	0.333
Q75	0.391	0.338		-0.607	-0.323	-0.383
Q10	0.336			-0.588		
Q122				-0.575	-0.340	
Q69				0.567	0.318	
Q74	0.322			-0.556		-0.306
Q46				0.548	0.391	0.353
Q16			0.357	0.547		
Q115		0.419		-0.528	-0.360	
Q125	0.339	0.308		-0.524	-0.439	-0.342
Q54	0.310			0.497		
Q31				0.481		
Q8				-0.481		
Q51				0.477		0.316
Q66				0.471	0.357	
Q45				-0.460	-0.332	
Q90			0.308	0.415		
Q1				0.405		
Q44				0.390		0.343
Q99			0.301	0.381		
Q134				0.351		
Q97				-0.318		
Q15						
Q129						
Q3						
Q128	-0.329	-0.429			0.515	0.325
Q133		-0.390			0.500	
Q33		-0.425			0.483	
Q61	0.334			-0.326	-0.438	
Q87					0.433	
Q94		-0.301			0.433	
Q80					0.377	
Q78		-0.318			0.376	
Q62					0.354	
Q42					0.334	
Q124						
Q130						
Q47						
Q131						-0.724

Q71	0.367				-0.695
Q109		0.314			-0.588
Q127					-0.550
Q81	0.350	0.305			-0.536
Q34					-0.530
Q70					-0.523
Q111	0.432	0.342			-0.461
Q77				0.405	0.432
Q113				0.303	0.397
Q93					-0.389
Q49			0.317		-0.352
Q95					
Q6					
Q2					
Q41					

7.3.4 Interpretation and Naming the Factors

Although factor analysis is able to identify latent constructs within the items, it is not able to interpret these items; such interpretation is therefore the responsibility of the researcher. This interpretation is based primarily on the item pattern coefficients in the pattern matrix (see Table 7-5), with each coefficient representing the unique contribution of each variable to its factor (Russell, 2002). Accordingly, and in line with recommendations in the literature (Fabrigar & Wegener, 2012; Field, 2005; Tabachnick & Fidell, 2014), the meaning of each factor was based upon the strongest loading items within that factor. Once the highest loading items (i.e., those with pattern coefficients > 0.4) without cross-loadings had been identified for each factor, the wording of each item was examined in order to ascertain the appropriate meaning of the construct. Lower loading items were also considered at this point to aid factor interpretation. Items that did not fit conceptually to the factor (i.e., items that did not measure the intended construct) were discarded at this point. Items with complex loadings (such as unexpected negative loadings, cross loading items, correlated factors etc.) were also

examined to identify the nature of their complexities. This was particularly pertinent in the case of the PCDEQ2, as it was initially designed to measure a range of multi-dimensional constructs, with different dimensions assessing positive attributes, negative attributes and attributes that offer a potential dual-effect. This resulted in several initially unexpected reversed loadings within factors, where, for example, an item from a negative dimension grouped into a positive factor following the EFA. This was further complicated in some cases, with the inclusion of reverse scoring items being grouped in factors with different dimensionalities. In such cases, careful attention was paid to the wording of the items to ensure they did indeed measure their intended constructs. The wording of the two cross loading items was also examined to ensure they were grouped appropriately, and were subsequently retained for interpretation. Following this phase, 44 items were removed from the process.

The 91 remaining items were assessed using corrected item-total correlation values to determine their meaningful contribution to their scales. All bar 3 items returned acceptable results (i.e., > 0.3; Pallant, 2013), with the 3 low scoring items subsequently removed from the questionnaire. Following the removal of these items, internal reliability was tested using Cronbach's alpha, reporting acceptable to excellent values (i.e., $\alpha > 0.7$; Field, 2005; Tabachnick & Fidell, 2014) ranging from 0.704 to 0.905. The alpha values were also checked for the impact of removing each item from the scale. No 'alpha if item deleted' values reported higher than the factors' alpha scores, supporting the findings that each item actively contributed to the overall factor score. Following the recommendations of Henson et al. (2004), a second EFA was then conducted on the 88 items retained following rotation, confirming the 7 factor solution (see Table 7-5) and accounting for 40% of the variance. The 88 item, 7 factor PCDEQ2 was subsequently presented to an independent expert panel (n = 2), with expertise in both questionnaire design and the psychology of talent development. Following

examination of the items within each factor and their respective loadings, factor titles were proposed and discussed in relation to their suitability and appropriateness, with agreement reached by all concerned on the final factor titles.

Table 7-5. 88 Item PCDEQ2 Pattern Matrix

	Factor						
	1	2	3	4	5	6	7
Q112	-0.651						
Q19	-0.566						
Q69	-0.528						
Q88	-0.489						
Q31	-0.484						
Q10	-0.464					-0.330	
Q74	-0.450					-0.309	
Q75	-0.447					-0.329	
Q46	-0.445						
Q54	-0.438						
Q51	-0.433						
Q122	-0.431						
Q115	-0.418		-0.307				
Q16	-0.395			0.372			
Q66	-0.385						
Q45	-0.350						
Q125	-0.349						
Q8	-0.322						
Q99	-0.306						
Q134	-0.304						
Q90	-0.301			0.301			
Q135		0.783					
Q96		0.755					
Q58		0.707					
Q57		0.704					
Q82		0.646					
Q55		0.639					
Q12		0.590					
Q67		0.476					
Q64		0.461					
Q76		0.396					
Q65		0.375					
Q39		0.334					
Q118		0.333					
Q73		0.308					
Q121		0.300					
Q18			0.729				
Q86			0.712				

Q106		0.461		
Q102		0.461		
Q108		0.460		
Q114		0.457		
Q107		0.422		
Q126		0.420		
Q83		0.417		
Q120		0.414		
Q59		0.406		
Q25		0.406		
Q105		0.363		
Q68		0.314		
Q84			0.505	
Q20			0.499	
Q116			0.497	
Q7			0.484	
Q28			0.399	
Q91			0.396	
Q48			-0.379	
Q92			0.354	
Q13			0.307	
Q1			0.303	
Q131				0.779
Q71				0.656
Q109				0.590
Q34				0.546
Q127				0.532
Q70				0.521
Q81				0.442
Q111				0.397
Q77	0.345			0.396
Q30				0.616
Q37				0.534
Q36				0.490
Q11				0.476
Q35				0.414
Q110				0.384
Q101		0.338		0.350
Q117				0.333
Q9				0.311
Q27				0.301

Q133			0.397
Q94			0.388
Q128			0.380
Q87			0.346
Q80			0.342
Q33	-0.320		0.328
Q62			0.325
Q42			0.318
Q61		-0.340	0.313

7.3.4.1 Factor 1: Adverse Response to Failure. This factor explained 2% of the total variance, and consisted of 21 items (Questions 112, 19, 10, 88, 16, 69, 75, 122, 74, 31, 46, 115, 8, 54, 125, 45, 66, 51, 90, 99, 134). The items within this factor included the majority of the items relating to fear of failure, along with items associated with anxiety, depression and perfectionism. This factor also included several negatively framed questions relating to PCDEs including focus and distraction control, goal setting and resilience. Item 112 was the highest loading item ("When I am failing, I worry most about what others think of me"), with loadings ranging from 0.671 to 0.337. Internal consistency was very high within this factor ($\alpha = 0.905$), with no meaningful impact caused by the deletion of any items. Item-total correlations ranged from 0.615 to 0.334.

7.3.4.2 Factor 2: Imagery and Active Preparation. This factor explained 9.96% of the total variance, and incorporated 15 items (Questions 135, 96, 58, 57, 82, 55, 12, 67, 64, 76, 65, 39, 118, 73, 121). This grouping of items predominantly consisted of the PCDE imagery, but also included aspects of the PCDEs planning and organisation, and goal setting, with the naming of the factor reflecting this preparatory aspect. The pattern coefficients ranged from 0.783 to 0.300, with the highest loading item being item 135 ("I use mental rehearsing to focus myself on what I have to do"). Internal consistency proved strong, with a Cronbach's alpha score of 0.876. No meaningful

change to this was evident when any items were deleted. Item-total correlations ranged from 0.690 to 0.396.

7.3.4.3 Factor 3: Self-Directed Control and Management. This factor accounted for 3.64% of the total variance, and contained 14 items (Questions 18, 86, 106, 102, 108, 114, 107, 126, 83, 120, 59, 25, 105, 68). These items reflected the role of self-regulation and self-control, and also incorporated self-determined aspects of PCDEs such as quality practice, planning and organisation, goal setting and performance evaluation. 10 of the items were negatively framed, with pattern coefficients ranging from 0.729 to 0.314. The highest loading item was the negatively framed item 18 ("I do certain things that are bad for me if they are fun"). Internal consistency was good, with a Cronbach's alpha of 0.829, with no meaningful change following item deletion. Item-total correlations ranged from 0.623 to 0.326.

7.3.4.4 Factor 4: Perfectionistic Tendencies. 2.21% of the total variance was attributed to this factor. The 10 items (Questions 1,116, 84, 7, 20, 92, 48, 13, 28, 91) focussed on the dual effect characteristics, particularly that of perfectionism and some obsessive aspects of passion. Items relating to anxiety and performance evaluation also featured. Pattern loadings ranged from 0.505 to 0.303, with item 84 ("People around me expect me to be perfect") loading the highest. Internal consistency was acceptable, with a Cronbach's alpha of 0.715, and was not meaningfully affected by the deletion of any items, suggesting a common underlying theme. Item-total correlations ranged from 0.510 to 0.301.

7.3.4.5 Factor 5: Seeking and Using Social Support. This factor explained 2.77% of the total variance and consisted of 9 items (Questions 131, 71, 109, 34, 127, 70, 81, 111, 77), four of which were negatively framed. The item content related to the PCDE creating and using support networks, but also included aspects of role clarity and commitment. Pattern coefficients ranged from 0.779 to 0.396, with the highest loading

item being item 131 (“I am keen to ask other people for help”). This factor had good internal consistency (α = 0.814), with item deletion having no meaningful impact on this figure. Corrected item-total correlations ranged between 0.678 to 0.393.

7.3.4.6 Factor 6: Active Coping. This factor accounted for 2.34% of the total variance, and included 10 items (Questions 30, 37, 36, 11, 35, 110, 101, 27, 117, 9). These items related to the proactive nature of engaging with developmental challenge, incorporating aspects of PCDEs such as resilience, commitment and role clarity, goal setting and focus. Pattern coefficients ranged from 0.616 to 0.301, with Q30 (“I can deal with whatever comes my way”) loading the highest. Internal consistency was good, with a Cronbach’s alpha of 0.805. The deletion of items did not result in any meaningful changes to the internal consistency. Corrected item-total correlations ranged from 0.607 to 0.367.

7.3.4.7 Factor 7: Clinical Indicators. The final factor explained 2.3% of the total variance, and consisted of 9 items (Questions 133, 94, 128, 87, 80, 33, 62, 42, 61). The items described symptoms relating to depression, eating disorders and behavioural change. Pattern coefficients ranged from 0.397 to 0.313, with item 133 (“I feel tired and have little energy more often than my peers”) loading highest. Internal consistency was adequate, with a Cronbach’s alpha of 0.72. Deleting items within the scale had no meaningful effect on the alpha score. Item-total correlations ranged from 0.502 to 0.346.

Table 7-6 shows the wording of each item within each factor, whilst Table 7-7 lists each item, its factor loading, item-total correlation, and mean score with standard deviation.

Table 7-6. The 88 Item, 7 Factor PCDEQ2

Factor	Items
Factor 1	Even minor setbacks disturb my focus
Adverse Response to	I often keep thinking about the mistakes I have made and let this interfere with my performance
Failure	When I am not succeeding, I feel like people lose interest in me
(21 Items)	When things are not going well, I get worried about what other people will think
	I often feel nervous
	I find it difficult to overcome my feelings of anxiety when I perform
	I often worry that bad things will happen
	My sleep is often disturbed by worrisome thoughts
	I often lie awake at night thinking things over and over
	I sometimes feel down without really knowing why
	When I am failing, I am afraid I might not have what it takes
	If I make a mistake I dwell on it and can't see the big picture
	When I make a mistake I find it difficult to get my focus back on task
	When things are going wrong for me, my future seems uncertain
	Although they may not say it, other people get upset when I make mistakes
	When I am failing at something, I hate the fact that I am not in control of the outcome
	When I am failing, I worry most about what others think about me
	I get distracted thinking about how other performers are doing
	The day-to-day setbacks can often get me down
	When things go wrong, I find it difficult to see a way forwards
	I tend not to worry about things
Factor 2	I include imagery in my preparation

Imagery and Active Preparation (15 Items)	When I have to do something that worries me, I imagine how I will overcome my anxieties and perform successfully
	Before attempting a skill, I imagine myself performing it
	I incorporate mental rehearsal in my practice
	Before I arrive at a performance venue, I mentally rehearse my performance there
	I tend to run through things over and over again
	I take time to clarify what is required
	I regularly imagine what a good performance feels like
	I regularly set clear targets for myself
	I have a carefully thought out plan of my pathway to the top
	I like to try things out in my head first
	I use imagery to improve my physical performance
	I imagine coping with setbacks
	I can clearly see my pathway to the top
	I use mental rehearsing to focus myself on what I have to do
Factor 3 Self-Directed Control and Management (14 Items)	I do certain things that are bad for me if they are fun
	I am good at resisting temptation
	I sometimes forget items of equipment
	I would usually blame other people or circumstances for failure
	I often forget appointments or timings
	I often do things I know I shouldn't do
	I prepare carefully for training sessions
	My life is well organised
	I wish I had more discipline
	People would say that I am very self-disciplined
	I have a hard time breaking bad habits

	I am lazy
	I often act without thinking through all the alternatives
	I give myself treats even when I don't achieve my goals
Factor 4	When I fail, people are less interested in me
Perfectionistic	When I am failing, significant others are often disappointed in me
Tendencies	I get annoyed very easily
(10 Items)	The people around me expect me to be perfect at everything I do
	If I don’t give my sport all of my attention, all of the time, my performances will suffer
	I only feel happy when I win
	People around me expect me to be perfect
	I can't be bothered with people who don't always strive to better themselves
	My preparation for competition has to be exactly the same each time
	My mood depends entirely on my sporting success
Factor 5	I dislike asking people for help and advice
Seeking and Using	When faced with a problem there is no one I can ask to help
Social Support	If I don't know something, I will find out who to ask
(9 Items)	I often find it hard to talk to other people about things that are bothering me
	I know who to go to to get things done
	I often seek advice from different people
	I value and use the opinion of others about my performance
	I think asking other people for help is a sign of weakness
	I am keen to ask other people for help
Factor 6	I find it hard to push myself to overcome difficulties
Active Coping	I am able to adapt and change when things aren’t going right for me
(10 Items)	Failures do not distract me from my pathway to success

	I can deal with whatever comes my way
	My teammates would describe me as a consistent person
	If I encounter a problem I make a plan to get around it
	I work through set backs
	When we need to work hard I am first in the queue
	When things seem hopeless, I still keep going
	I like to take control when dealing with problems
Factor 7	I often lack energy
Clinical Indicators	I socialise with my teammates much less than I used to
(9 Items)	If something unexpected happens I find it really hard to adapt
	I worry about putting weight on
	I have lost interest in socialising with my training group
	After eating, I sometimes feel guilty about its effect on my body shape
	Compared to my teammates I often fail to complete a heavy training session
	I struggle to get myself motivated
	I feel tired and have little energy more often than my peers

Table 7-7. Factor Loadings, Item-Total Correlations, and Mean Scores

Factor	Factor Loading	Item-Total Correlation	Mean ± SD
Factor 1 (21 Items)			
8	-0.322	0.499	2.963 ± 1.4337
10	-0.464	0.597	3.033 ± 1.3566
16	-0.395	0.509	3.070 ± 1.3887
19	-0.566	0.586	3.514 ± 1.4002
31	-0.484	0.443	3.807 ± 1.5501
45	-0.350	0.492	2.598 ± 1.2966
46	-0.445	0.598	2.932 ± 1.4861
51	-0.433	0.518	2.223 ± 1.4021
54	-0.438	0.504	3.121 ± 1.6790
66	-0.385	0.508	2.885 ± 1.4898
69	-0.528	0.573	3.121 ± 1.4768
74	-0.450	0.581	2.842 ± 1.3434
75	-0.447	0.655	2.764 ± 1.2702
88	-0.489	0.637	2.887 ± 1.3428
90	-0.301	0.417	3.482 ± 1.2759
99	-0.306	0.354	4.047 ± 1.3366
112	-0.651	0.615	3.445 ± 1.4662
115	-0.418	0.538	2.887 ± 1.3830
122	-0.431	0.601	2.883 ± 1.2219
125	-0.349	0.582	2.531 ± 1.2014
134	-0.304	0.334	3.719 ± 1.4386
Factor 2 (15 Items)			
12	0.590	0.444	4.484 ± 1.3591
39	0.334	0.407	4.211 ± 1.1647
55	0.639	0.537	4.275 ± 1.3779
57	0.704	0.632	3.996 ± 1.3563
58	0.707	0.634	4.215 ± 1.3594
64	0.461	0.522	4.211 ± 1.2412
65	0.375	0.495	4.230 ± 1.0897
67	0.476	0.499	4.410 ± 1.3763
73	0.308	0.450	4.512 ± 1.1243
76	0.396	0.517	4.131 ± 1.2777
82	0.646	0.562	4.291 ± 1.2336
96	0.755	0.663	4.352 ± 1.3262

118	0.333	0.464	3.697	±	1.4156
121	0.300	0.396	3.975	±	1.2233
135	0.783	0.690	4.152	±	1.3316
Factor 3 (14 Items)					
18	0.729	0.567	4.572	±	1.3148
25	0.406	0.399	4.127	±	1.4216
59	0.406	0.436	4.758	±	1.3706
68	0.314	0.411	4.938	±	1.0506
83	0.417	0.458	4.912	±	1.2172
86	0.712	0.623	4.666	±	1.2866
102	0.461	0.479	4.256	±	1.1134
105	0.363	0.468	4.297	±	1.2122
106	0.461	0.490	4.135	±	1.5322
107	0.422	0.510	4.314	±	1.3051
108	0.460	0.450	4.023	±	1.3210
114	0.457	0.478	4.857	±	1.2532
120	0.414	0.370	3.637	±	1.3304
126	0.420	0.326	4.625	±	1.2912
Factor 4 (10 Items)					
1	0.303	0.330	2.818	±	1.2989
7	0.484	0.451	3.279	±	1.3205
13	0.307	0.259	3.396	±	1.5005
20	0.499	0.482	3.221	±	1.3607
28	0.399	0.336	3.605	±	1.4075
48	-0.379	0.328	3.756	±	1.6389
84	0.505	0.510	3.258	±	1.4751
91	0.396	0.325	3.783	±	1.3756
92	0.354	0.290	3.658	±	1.5100
116	0.497	0.456	3.770	±	1.4272
Factor 5 (9 Items)					
34	0.546	0.539	4.021	±	1.4326
70	0.521	0.462	5.131	±	1.0856
71	0.656	0.646	4.668	±	1.2047
77	0.396	0.406	3.590	±	1.5627
81	0.442	0.475	4.590	±	1.0523
109	0.590	0.539	4.094	±	1.3588
111	0.397	0.393	4.848	±	0.9813
127	0.532	0.517	4.477	±	1.4590
131	0.779	0.678	4.158	±	1.3228

Factor 6 (10 Items)					
9	0.311	0.382	4.955	±	1.0908
11	0.476	0.488	4.520	±	0.9830
27	0.301	0.375	4.186	±	1.4317
30	0.616	0.600	4.689	±	0.9688
35	0.414	0.415	4.418	±	0.9798
36	0.490	0.509	4.383	±	1.0136
37	0.534	0.593	4.748	±	0.9757
101	0.350	0.544	4.516	±	1.1173
110	0.384	0.557	4.836	±	0.9992
117	0.333	0.434	4.678	±	1.0504
Factor 7 (9 Items)					
33	0.328	0.471	2.549	±	1.1877
42	0.318	0.278	2.477	±	1.4455
61	0.313	0.407	2.496	±	1.0356
62	0.325	0.346	2.398	±	1.5991
80	0.342	0.395	1.846	±	1.0661
87	0.346	0.350	2.680	±	1.6166
94	0.388	0.420	1.959	±	1.0927
128	0.380	0.484	2.170	±	1.2498
133	0.397	0.502	2.430	±	1.1981

7.4 Summary

The final iteration of Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2) resulted in a 7 factor, 88 item questionnaire (16 items of which were negatively framed), designed to assess key constructs recognised as influencing talent development both positively and negatively. The 88 item question accounted for 40% of the total variance. Through the process of exploratory factor analysis detailed in this chapter, a total of 44 items were discarded due to low loadings, whilst a further 3 items were removed due to problematic item-total correlations. Of the remaining 88 items, 16 were negatively worded. The items per factor ranged from 9 to 22, with an average of 12.6 items per factor, well above the recommendation of a

minimum of 3 items per factor (Costello & Osborne, 2005; Tabachnick & Fidell, 2014). The overall reliability of the PCDEQ2 reported a Cronbach's alpha of 0.879, with intra-factor reliability scores ranging from 0.715 to 0.904.

7.5 Discussion

The 88 item PCDEQ2 measures 7 different constructs associated with effective talent development. Given the inter-item reliability scores for each factor, each item can be said to measure its associated construct. Examination of the structure matrix showed moderate correlations between factors, suggesting that the constructs were distinct but related. However, as these correlations were not high (i.e., < 0.8; Pallant, 2013), it was not appropriate to subsume smaller factors in to one, larger factor (Field, 2005). Despite differing significantly from the original 17 proposed constructs identified in Chapters 3,4 and 5 (and summated in Chapter 6), items associated with each of the initial 17 constructs were represented within the 7 factor model.

The decision to adopt a 7 factor model (as opposed to any other number of factors) involved several key considerations. In line with the recommendations, (Costello & Osborne, 2005; Fabrigar et al., 1999; Tabachnick & Fidell, 2014), multiple criteria were used to help determine the appropriate solution. Furthermore, Fabrigar and Wegener (2012) suggest:

> Thus, determining the appropriate number of common factors is a decision that is best addressed in a holistic fashion by considering the configuration of evidence presented by several of the better performing procedures. Moreover, it is a decision that is as much theoretical as it is statistical. (p. 55)

Accordingly, examination of the scree plot (see Figure 7-1) suggested between 6 and 10 factors as possible solutions, with apparent breaks in the curve at 7 and 10 factors. Despite both the scree plot and parallel analysis suggesting a possible 10 factor solution

(see Table 7-2), when EFA was conducted, the 10 factor solution was unable to provide a satisfactory solution, with one of the factors containing only 3 items. Having such a low number of items to represent a factor is deemed problematic in EFA (Costello & Osborne, 2005; Tabachnick & Fidell, 2014), and as such, the 10 factor solution was discarded in favour of the more parsimonious 7 factor solution. The adoption of multiple criteria to determine factor extraction was an important part of the EFA process, limiting the potential detrimental impact of any singular approach.

Although due consideration was given in advance to that of sample size, and that the sample for this study was deemed appropriate given the quality of the data (i.e., the mean communalities were above 0.5 and there was a high overdetermination of factors; see MacCallum et al., 1999), re-examination with a larger sample is likely to yield more complete results due to the decreased variability in factor loadings across repeated samples (MacCallum et al., 1999). Despite Comrey and Lee's (1992) assertion that sample sizes in excess of 500 are "very good", the item to participant ration was only approximately 4:1. This falls outside recommendations of a minimum of 5:1 (e.g., Kass & Tinsley, 1979; Nunnally & Bernstein, 1994), which has been shown to offer a 40% chance of obtaining a complete factor structure. Increasing this to a 20:1 ratio improves the likelihood of returning a complete factor structure to up to 70%, and decreases the average error in factor loadings from 0.15 to 0.07 (Osborne & Costello, 2009). However, given the large number of items in the initial version of the questionnaire combined with the elite nature of the participants, achieving this ratio in practice would be highly problematic, requiring upward of 2,700 participants for the 135 item questionnaire.

A key consideration when assessing the psychometric properties of the PCDEQ2 is that of the validity of the data collated. In particular, the impact of socially desirable responding is of concern, given its association with over- and under-reporting in a sport

and physical activity setting (Brenner & DeLamater, 2013). Although steps were taken throughout this study to minimise the effect of this phenomenon such as assurances of confidentiality, given the target demographic of the questionnaire (i.e., adolescents), such issues around social desirability, acceptability and identity are pervasive (Brenner & DeLamater, 2013; Bruner et al., 2014; Rees, Haslam, Coffee, & Lavallee, 2015). Accordingly, further controls to mitigate such influence may be required.

Given that the initial pool of 17 constructs was drawn from empirical data and extant literature (see Chapter 6), it is important to consider the new factor structure in such a context. Factor 1, *Adverse Response to Failure*, draws primarily on the literature presented in Chapter 5 but also includes items initially intended to relate to anxiety, depression, focus and perfectionism, assessing the individual's maladaptive responses to failure. Such a grouping of items from these differing constructs is unsurprising, given their established relationships (Grant et al., 2013; Sagar & Stoeber, 2009). Accordingly, athletes scoring highly in this domain are likely to have suboptimal interaction with developmental challenge. Factor 2, *Imagery and Active Preparation*, highlights the need for effective and controllable imagery in both skill refinement and arousal management; a fact borne out by existing literature (e.g., Gould et al., 2002; Holmes & Collins, 2001; Orlick & Partington, 1988). Furthermore, *Imagery and Active Preparation* differs from the original PCDE "Imagery use during practice and competition" (cf. MacNamara, 2011), due to its self-regulated planning and goal setting components. Factor 3, titled *Self-Directed Control and Management*, draws heavily on the construct of self-regulation and self-control, and is a positive influence on talent development (Toering et al., 2009; Toering et al., 2013) Again, the title is designed to reflect the aspects of planning and organisation that have been grouped with the items relating to self-regulation following the EFA. Factor 4, *Perfectionistic Tendencies*, consists of a combination of items initially included to assess perfectionism, anxiety,

fear of failure and the obsessive component of passion, along with one negatively framed item relating to realistic performance evaluation. As with Factor 1, the established relationships within the literature (see Chapter 5) explain the grouping of these different constructs. However, given that this factor draws on items from other constructs, the term *perfectionistic tendencies* was adopted over "perfectionism", as a high score on this factor would likely indicate perfectionism, but would not be a diagnosis. *Seeking and Using Social Support* is Factor 5, and is based around the facilitative role effective support networks play along the talent development pathway. Given the inherent challenge associated with talent development, significant others are often relied upon for support when negotiating this challenge (e.g., Gould, Lauer, Rolo, Jannes, & Pennisi, 2006; Gould et al., 2008; see also Chapters 3 and 4). Factor 6, *Active Coping*, predominantly encompasses the constructs of resilience and commitment. However, given the somewhat passive nature of resilience (i.e., if you have coped with setbacks or survived a trauma, you are deemed resilient), *active coping* differs from resilience in that it recognises the proactive, self-regulated deployment of coping mechanisms. The final factor, *Clinical Indicators*, incorporates items from each of the original constructs identified as pertaining to mental health and clinical issues, namely eating disorders, depression, anxiety, and behavioural change. As identified in Chapter 4, these issues can have a detrimental effect to not only talent development, but also athlete wellbeing.

7.6 Moving Forward

Following the development and initial validation of the PCDEQ2, 7 key areas have been identified as significantly influencing the talent development process, both positively and negatively. By formatively assessing these areas, coaches and support staff will be able to design appropriate interventions with a view to improving the

athlete's psycho-behavioural responses to developmental challenge. It also follows that athletes scoring well in the PCDEQ2 would – at the point of assessment, at least – be seen as most likely to succeed and progress to elite sport. Accordingly, and in line with the development of the original PCDEQ, it is important to consider the extent to which the PCDEQ2 can differentiate between effective and poor developers. With this in mind, Chapter 8 seeks to assess the predictive validity of the PCDEQ2 through discriminant function analysis.

8. EXAMINING THE PREDICTIVE VALIDITY OF THE PCDEQ2

8.1 Introduction

Having developed and assessed the initial validity and reliability of the PCDEQ2 through exploratory factor analysis, the questionnaire can be said to accurately and reliably assess the range of psycho-behavioural characteristics identified throughout this thesis and summated in Chapter 6 that determine the realisation of potential. Despite its intended use as a formative assessment tool as opposed to a summative one, it is important to understand the relative contribution to effective development made by each of the PCDEQ2's factors. Such an understanding would help practitioners develop effective interventions based on the questionnaire's results. Accordingly, this chapter seeks to establish the criterion validity of the PCDEQ2 – the extent to which each factor would contribute to a given outcome. Establishing this validity is an important part of establishing the PCDEQ2's psychometric properties (Nunnally & Bernstein, 1994; Rust & Golombok, 2009), and is best achieved through the process of discriminant function analysis.

The purpose of discriminant function analysis (DFA) is to classify naturally occurring groups based upon a combination of variables, allowing those variables to predict group membership. Within the context of talent development, and more specifically, the PCDEQ2, DFA can be used to determine those variables that discriminate between groups. Ideally, a longitudinal approach to this study would allow the clear demarcation of groups for analysis; namely those who attained elite status and those who did not. Unfortunately, due to the limitations of time and resources associated with this doctoral programme, this was not possible. Instead, a cross-

sectional approach was adopted, whereby *likelihood* of progression to elite level was assessed. Despite this prediction being based on subjective judgement with a potentially significant time gap, any impact to the study's validity may not be too detrimental, as the prediction is being made by experts with an array of experience of developing athletes in their own domain. Furthermore, the actual process of selection through the ranks and to elite level in team sports is more often than not a subjective one itself, based on the opinions of – amongst others – scouts, coaches, and managers (Christensen, 2009; Miller, Cronin, & Baker, 2015).

8.2 Method

8.2.1 Participants

Reflecting the demographic adopted for the generation of the PCDEQ2, a total of 342 participants were purposively sampled from male, team sport academy programmes in football, rugby union and rugby league. Their ages ranged from 13 to 19 years (M = 15.16, SD = 1.248), and all were members of representative squads, competing at either regional, national, or international level in their chosen sport. As was the case for the previous chapter, all ages were calculated as of the 1st September, 2015, in line with age-group selection cut-off.

8.2.2 Procedure

Following ethical approval, all participating athletes were invited to complete the 88 item, 7 factor PCDEQ2, with data collection taking place at the athletes' primary training location under the supervision of myself. Where participants were under the age of 16, parental consent was also sought. Confidentiality was assured throughout the process. Participants were reminded that the purpose of the study was not to test them,

but rather to test the questionnaire, with a strong emphasis placed on answering as openly and as honestly as possible.

Once the data had been collected, coaches and academy directors were asked to complete a subjective player rating scale (see Appendix J). This scale was designed to establish the likelihood of progression to elite level, based on a combination of the behaviours expressed by the players and the expertise of the coach. The five-point Likert scale ranged from 1 ("extremely unlikely"), through to 5 ("extremely likely"), with the remaining response options "unlikely", "neutral", and "likely". Each of the assessing coaches and / or academy directors had been recently involved in the development of the players they assessed at the time of data collection.

Given the need to discriminate between groups, all data classified as "neutral" was discarded from any subsequent analysis at this point, while the remaining data were classified in to two groups. Those ranked either 1 or 2 on the subjective player rating scale (i.e., "unlikely" or "extremely unlikely") were classified as "low likelihood", whilst those scoring either 4 or 5 on the scale were classified as "high likelihood". As a consequence of this classification, 146 data sets were removed, leaving a total of 225 data sets, 155 of which were classed as "low likelihood", and 70 "high likelihood". Despite such a difference in group size, the underpinning assumptions of DFA render such a disparity unproblematic (Pallant, 2013; Tabachnick & Fidell, 2014), whilst the total sample size can be considered appropriate for DFA (Field, 2005; Tabachnick & Fidell, 2014).

8.2.3 Data Analysis

In order to examine the discriminant validity of the PCDEQ2, a multivariate analysis of variance (MANOVA) was first employed to test for differences between groups using SPSS (with significance set at $p < 0.05$). DFA was subsequently used to

establish whether the variables within the PCDEQ2 could reliably predict group membership. Essentially a MANOVA in reverse yet computationally identical, DFA uses the independent variables as predictors, whilst the dependent variables are the groups, whereas a MANOVA uses the dependent variables as the predictors with the independent variables as the groups. The first stage of the process is to compare the matrix of total variances and co-variances with the matrix of pooled within-group variances and co-variances via multivariate F tests (Field, 2005; Nunnally & Bernstein, 1994). This determines any significant differences between groups. Following this, classification of variables was undertaken to identify which variables can predict group membership. Given that the DFA is procedurally identical to the MANOVA, it is also subject to the assumptions of normality, homogeneity of variance, outliers, linearity, multicollinearity and singularity (Pallant, 2013).

8.3 Results

Assumption testing was conducted to check for normality, homogeneity of variance, outliers, linearity, multicollinearity and singularity, with no concerns noted. A Mahalanobis distance of 23.36 was calculated, below the critical value of 24.32 for a seven dependent variables, suggesting multivariate normality (Tabachnick & Fidell, 2014). Correlations between the variables ranged from 0.147 to 0.609, offering no cause for concern (Pallant, 2013). Box's M test was not significant ($F = 1.287$, $p > 0.05$), indicating homogeneity of variance-covariance matrices for each group. Preliminary analysis revealed that there was a difference in PCDEQ2 scores between the high likelihood and low likelihood groups ($F(7,217) = 8.101$, $p < 0.001$, Wilks Lambda = 0.793, partial eta squared = 0.207). The means, standard deviations and levels of significance from the tests are presented in Table 8-1. An initial examination of the groups means show that those in the high likelihood groups scored better (i.e.,

higher on the adaptive factors, lower on the maladaptive factors) than their low likelihood counterparts, suggesting that those athletes with a higher likelihood of progression to elite level were more likely to possess and operationalise PCDEs, whilst simultaneously avoiding negative developmental behaviours.

Table 8-1. Means, Effect Sizes, and Significance Levels for PCDEQ2 Factors and Subjective Player Progression Rating

Factor	High Likelihood Group Mean (±SD)	Low Likelihood Group Mean (±SD)	Effect Size	Significance	Significance following Bonferroni adjustment
Factor 1	2.599 (0.669)	3.285 (0.828)	0.143	$p < 0.001$	$p < 0.001$
Factor 2	4.191 (0.829)	4.206 (0.776)	0.000	$p > 0.05$	$p > 0.05$
Factor 3	4.764 (0.636)	4.386 (0.658)	0.068	$p < 0.001$	$p < 0.001$
Factor 4	3.267 (0.808)	3.555 (0.716)	0.031	$p < 0.01$	$p > 0.005$
Factor 5	4.667(0.744)	4.261 (0.876)	0.048	$p < 0.005$	$p < 0.005$
Factor 6	4.981 (0.538)	4.410 (0.665)	0.152	$p < 0.001$	$p < 0.001$
Factor 7	1.992 (0.615)	2.393 (0.717)	0.069	$p < 0.001$	$p < 0.001$

At this point, six of the seven factors showed statistically significant differences between the two groups. These were Factor 1 "*Adverse response to failure*", Factor 3 "*Self-directed control and management*", Factor 4 "*Perfectionistic tendencies*", Factor 5 "*Seeking and using social support*", Factor 6 "*Active coping*", and Factor 7 "*Clinical indicators*". As the calculations involve a number of separate analyses, a Bonferroni adjustment was made to give a new alpha of 0.007. Subsequent to this, Factors 1, 3, 5, 6, and 7 remained significant, whilst Factor 4 failed to reach statistical significance. In line with criteria established by Cohen (1988, pp. 284-287), large effect sizes were noted for Factors 1 and 6, whilst medium effect sizes were noted for Factors 3, 5, and 7.

The DFA was conducted in order to determine the PCDEQ2's ability to predict group membership. Given the unequal group sizes, probabilities for each group were computed from the group sizes. The results showed a statistically significant

discriminant function of the PCDEQ2 (Wilks Lambda = 0.793, $\chi^2 = 50.959$, $p < 0.001$), with a canonical correlation of 0.455. The PCDEQ2 was able to correctly predict 72.9% of the participant groupings, as detailed in Table 8-2.

Table 8-2. Predicted Group Membership

	Low Likelihood Group Prediction	High Likelihood Group Prediction
Low Likelihood Group (*n* = 155)	133 (85.8%)	22 (14.2%)
High Likelihood Group (*n* = 70)	39 (55.7%)	31 (44.3%)

The standardised canonical discriminant function coefficients and the canonical structure matrix were also examined (see Table 8-3), as these indicate the extent to which the different variables contribute to group separation. These highlight the particularly large contribution of Factor 6 (*active coping*) and Factor 1 (*adverse response to failure*) in group differentiation.

Table 8-3. Canonical Discriminant Function Coefficients and Structure Matrix

	Canonical Discriminant Function Coefficients	Canonical Structure Matrix
Factor 1	-0.493	-0.798
Factor 2	-0.168	-0.016
Factor 3	0.036	0.528
Factor 4	-0.111	-0.352
Factor 5	-0.031	0.440
Factor 6	0.751	0.827
Factor 7	0.116	-0.531

8.4 Discussion

The purpose of this study was to determine the discriminant nature of the PCDEQ2. Following the DFA, the PCDEQ2 was recognised to have correctly

classified 72.9% of participants based on their responses. Such an overall efficacy compares similarly to that of the original PCDEQ, which was sufficiently sensitive to classify 75% of team sport participants correctly (MacNamara & Collins, 2013). Accordingly, the PCDEQ2 can be said to discriminate between athletes deemed likely to progress to elite level and those deemed unlikely.

By differentiating between athletes likely to progress to elite level from those less likely to, based on their psycho-behavioural characteristics, the PCDEQ2 offers a great deal of utility to the talent development process. Of particular interest is the influence of each factor on the overall discriminant function. Factor 6, *active coping*, was the single largest contributor to group prediction, and when set against the key features of talent development, this makes sense. As discussed in Chapter 2 in detail, the process of developing talent requires significant, targeted challenge over a prolonged period of time. *Active coping* assesses the athlete's ability to proactively respond to and negotiate challenge through the self-regulatory deployment of coping strategies. Consequently, the factor plays a significant role in optimally negotiating these developmental challenges. Factor 1, *adverse response to failure*, was similarly influential in determining group membership. The findings presented earlier in the thesis (see Chapters 2, 3, and 5) highlight the mechanisms through which fear of failure is detrimental to effective talent development. Despite being positioned as a dual-effect characteristic, given its considerable contribution to group prediction, the results emanating from this study would suggest that – for this cohort at least – the effect of fear of failure is predominantly maladaptive. Factor 3, *self-directed control and management*, is based around self-regulation and self-control, and impact upon the individual's response to developmental challenge. These constructs have already been proven to differentiate between elite and non-elite groups (Toering et al., 2009; Toering & Jordet, 2015), so their influence in the context of the PCDEQ2's discriminative

quality is unsurprising and expected. Similarly, Factor 5, *seeking and using social support*, impacts at the response stage to challenge. Where challenge is deemed too great to negotiate, or when faced with an under-developed component of talent (i.e., a rate limiter – see Chapter 2), and if the challenge presented is necessary or unavoidable, external help is required in order to overcome it. In doing so, the athlete is able to progress or continue to work on the rate limiter. Conversely, if this does not occur, the challenge becomes insurmountable and development stalls; hence its discriminative contribution. The qualitative findings discussed earlier in this thesis (see Chapter 4), highlight the potentially maladaptive effects of clinical issues to both athlete wellbeing and talent development. As such, a high score in Factor 7 – *clinical indicators* – although not diagnostic, would suggest the presence of behaviours symptomatic of clinical issues that would mitigate the efficacy of developmental interaction.

Having examined the factors that have been shown to discriminate between group membership, it is also pertinent to look at those factors that did not discriminate, in a bid to better understand and inform the effective use of the PCDEQ2. Despite *imagery and active preparation's* widely recognised role as an adaptive skill for sport performance, skill development, and as part of injury rehabilitation (e.g., Driediger et al., 2006; Gould et al., 2002; Holmes & Collins, 2001; Munroe-Chandler et al., 2007), not to mention its empirically-based inclusion as a PCDE (MacNamara et al., 2010a, 2010b), it is perhaps surprising to note Factor 4's lack of discriminative qualities. In fact, despite a lack of statistical significance, the results from the DFA actually suggested a small maladaptive contribution. Such an outcome is both curious, yet plausible. Due to the general nature of the items of the PCDEQ2, it is possible that athletes *may* be experiencing negative outcomes within their imagery practices. Given the association between negative outcome imagery and reduction in performance outcomes (Taylor & Shaw, 2002), such a hypothesis offers some explicative power. As

the general nature of the PCDEQ2's items is a necessary feature, given the need for it to be applicable in a range of environments, increasing the specificity of the items in the questionnaire would likely impact upon its utility. Instead, as a focus on negative outcomes within imagery is likely to increase anxiety or induce worries relating to failure, a more practical response might be to cross reference the individual's *imagery and active preparation* (Factor 4) scores with those of adverse response to failure (Factor 1) and *clinical indicators* (Factor 7), to see if such anxieties are present.

An explanation for the lack of significance for Factor 4, *perfectionistic tendencies*, can also be found in the qualitative findings presented earlier. As discussed in Chapters 3 and 5, perfectionism can be both adaptive or maladaptive, depending upon context. Perfectionistic strivings have been associated with positive adaptations, whilst perfectionistic concerns have been regarded as maladaptive. However, such differences have only been found when statistically controlling for the overlap between the two dimensions (Gotwals et al., 2012; Stoeber, 2011), whereas in actuality – and therefore in an applied context – the two have been shown to be highly correlated (Dunkley et al., 2003; Stoeber & Janssen, 2011). Consequently, it is likely that the net effect of perfectionism would be small, in either dimension.

8.5 Considerations around Deployment of the PCDEQ2

As this study has shown the PCDEQ2 to have a good level of predictive validity, coaches and practitioners alike may be tempted to use it as part of a talent identification process to facilitate the efficient deployment of developmental resources. However, to do so would be counterintuitive, counterproductive, and would go against the epistemological beliefs that lie at the heart of this thesis. One of the biggest criticisms of talent identification as a concept is that it when operationalised, it yields poor predictive validity (McCarthy & Collins, 2014; Vaeyens et al., 2008). Cross-sectional,

'snapshot' assessments of athletes' physiological, physical, anthropometrical, and technical attributes do not consider the temporal and dynamic nature of development (Abbott & Collins, 2002; 2004; see also Chapter 2), and therefore have little relevance to future potential. Despite this, such practices are still prevalent in both academic study and applied practice (e.g., O'Connor, Larkin, & Mark Williams, 2016; Wilson et al., 2016; Woods, Joyce, & Robertson, 2016; Woods, Raynor, Bruce, McDonald, & Robertson, 2016). Accordingly, any intended use of the PCDEQ2 as a screening and selection tool would be subject to the same issues and based upon the same false assumptions such as the linear nature of development. Instead, the PCDEQ2 is intended to be used *solely* as a formative assessment and monitoring tool, whereby areas for development are highlighted, behaviours are reinforced, and effectiveness of interventions are monitored.

A key delimitation of this study, and of the PCDEQ2 in general at this time, is the context in which it was developed. Having been developed and validated in a male, team-sport, academy setting, its results can only be deemed valid in the same context. In the case of the original PCDEQ, MacNamara and Collins (2013) noted that the overall criterion validity differed between team sport and individual sport participants, with 75% and 67% of participants correctly classified, respectively. Furthermore, the individual factors influencing group discrimination differed for team and individual sports. As such, care should be taken not to administer the PCDEQ2 outside of its established context, as to do so would likely compromise its criterion validity. Accordingly, future research should seek to validate the PCDEQ2 in a variety of developmental settings.

Having considered such conceptual issues, concerns around the practical application of the PCDEQ2 also need to be considered. For example, self-report bias and impression management are often a feature of questionnaires where participants are

asked to comment upon their own behaviours. Concerns over confidentiality may affect an individual athlete's reluctance to disclose important information, for example, in relation to items around *clinical indicators*, especially if they fear this may influence future team selection and transitions. Such an example has obvious implications for both for athlete wellbeing and talent development system efficacy. Accordingly, due consideration needs to be given to how the data is collated, reported, and applied.

Another key issue around the application of the PCDEQ2 is that despite offering significant discriminative qualities, it does not – and nor would it ever be expected to – explain 100% of the variance between groups. As discussed previously, the nature of talent development is highly complex and dynamic, and most definitely cannot be comprehensively explained by 7 factors! Genetic components, opportunity, chance, the social milieu and many other issues all contribute to the process. However, the skills assessed within the questionnaire do underpin effective development. Given their importance, whilst acknowledging the influence of other factors, the assessment made by administering the PCDEQ2 should form part of a triangulation process, offering multiple perspectives and methods, in order to generate the most accurate assessment possible.

9. CONCLUSIONS, DISCUSSION, AND FUTURE DIRECTIONS

9.1 Introduction

As a result of the ever-increasing economic, social, and political value of sport, talent identification and development has received significant attention in recent years, in terms of both research and applied practice. Despite this attention, however, many such talent development systems have been criticised for their poor predictive validity and lack of empirical support (Bailey & Collins, 2013; Collins & Bailey, 2013; Faber et al., 2015; Phillips et al., 2010; Vaeyens et al., 2009; Vaeyens et al., 2008). Accordingly, this thesis sought to examine the mechanics of talent development in a bid to identify ways in which such empirical support can be provided, and predictive validity improved. Acknowledging the existing research that recognises psychological characteristics as the key determinants of talent (e.g., Abbott & Collins, 2004; Abbott et al., 2007; MacNamara et al., 2010a, 2010b), the main objectives of this thesis were to:

- Provide conceptual clarity to talent and its development
- Identify the key mechanisms underpinning effective talent development
- Explore and establish the key psycho-behavioural characteristics associated with effective talent development.
- Develop a psychometric assessment tool that measures these key constructs – both adaptive and maladaptive – to facilitate formative assessment.
- Provide coaches and applied practitioners with a validated tool that offers both discriminative power and practical utility.

Recognising the breadth of scope of these research objectives, there was an inherent need to adopt a mixed methods approach throughout this thesis, with

qualitative data informing quantitative analyses. Accordingly, the results obtained from this approach are summarised in the following section.

9.2 Summary of Findings and Implications

The studies described in Chapter 2 sought to address Objectives 1 and 2, through defining talent as having the *potential* to perform at a high level. This draws a clear distinction between current ability and future potential, yet raises fundamental questions such as *what does potential look like, how do we turn it in to ability*, and *is there an objective measure for it*? In an attempt to answer these questions, existing models of talent development were explored, acknowledging different epistemological positions. Accordingly, the process of talent development was conceptualised as a complex, dynamic, and non-linear process of interaction between the individual athlete and developmental challenge, whereby successful negotiation of this challenge resulted in positive adaptations. Recognising the ubiquitous nature of challenge within talent development, the need for persistence-type characteristics and behaviours was acknowledged. Similarly, adaptation as a result of challenge was deemed to be dependent upon a range of self-regulatory skills, thus highlighting the role of psychological characteristics as determinants of talent, and the key to realising potential.

Chapter 3 sought to address the thesis' third objective by examining the psycho-behaviourally based characteristics of effective talent development within an applied setting. Having already established the adaptive role psychology plays in talent development in the previous chapter, this study sought not only to establish the positive characteristics operationalised in a talent development environment, but also those characteristics and behaviours deemed to be maladaptive. This was achieved through a series of semi-structured, qualitative interviews with rugby union academy directors and coaches. Following both inductive and deductive analyses, wide-ranging support was

found for the deployment of PCDEs. These PCDEs were operationalised in a variety of different ways, supporting the assertion that not only are PCDEs operationalised differently in different settings, but that there is also a wide range of inter-individual variability in their deployment (MacNamara et al., 2010b). However, despite such a prevalence of PCDEs, the PCDE of imagery was not reported by any participants, suggesting that it was either not operationalised by the athletes, or that it was not readily identifiable to the coaches. The latter seems a far more likely explanation, given imagery's established role in skill development and performance (Driediger et al., 2006; Gould et al., 2002; Munroe-Chandler et al., 2007), combined with its lack of overt, observable associated behaviours. Aside from PCDEs, self-regulated learning strategies were also reported throughout the data, such as self-control and metacognition. Furthermore, self-promoted PCDEs such as goal setting, self-organisation, planning and performance evaluation are in themselves recognised self-regulatory learning strategies (Toering et al., 2009; Zimmerman, 2006; Zimmerman & Kitsantas, 2007). Conversely, an absence of ownership and independence – qualities also associated with self-regulation (Jonker, Elferink-Gemser, & Visscher, 2010) – were reported by the coaches in those athletes who didn't go on to progress to elite sport. As such, self-regulation should be considered a key component of effective talent development. The dual-effect characteristics of passion and perfectionism were reported within the data, with coaches often employing measures to limit any maladaptive impact, such as overtraining. As one of the key negative behaviours, coaches described avoidance as being employed by many of the less successful athletes, given the associated lack of engagement with developmental challenge. Issues surrounding mental health were also recognised as a key concern. However, despite coaches recognising its prevalence – perhaps in part to its increasing profile – a lack of awareness and understanding of such issues was also

noted. As the primary point of contact with the athlete, this lack of awareness suggests that identification of such issues is likely to be sub-optimal.

Picking up where Chapter 3 left off in addressing Objective 3, Chapter 4 focussed specifically on the impact of clinical issues and mental health in talent development; recognised as exclusively maladaptive. Semi-structured, qualitative interviews were conducted with clinical psychologists, specialising in either sport and / or adolescent development. Following inductive analysis, four key areas were identified: behavioural indicators; identification issues; risk factors; and protective factors. Specific clinical issues (e.g., eating disorders) were recognised to yield a set of specific indicators, readily identifiable to trained clinicians, with unexplained behavioural change acting as a more general indicator. Given that such general signs can be deemed readily identifiable to those without a clinical background (Mazzer & Rickwood, 2014), it is both worrying and surprising that the data presented in both Chapters 3 and 4 suggested that many athletes were likely to be 'slipping through the net'. This issue was further compounded by that of non-disclosure due to perceived environmental pressures. As such, it is apparent that the integration of clinical expertise, either through employment or training, is ideally required in order to pick up on such issues more effectively. Similarly, incorporation of a validated psychometric assessment tool was recognised as an important part of triangulation, and would increase the likelihood of more general warning signs being identified by those without a clinical skillset. Curiously, on the whole, the sources of associated risk factors identified within the data reflected those associated with protective factors. For example, the family, the competitive nature of the training environment, and social evaluation from peers, were all identified as potential sources of stress, yet family and parental support, an open and supportive coaching environment, and peer support were said to play a significant role in protecting an athlete's mental wellbeing. The fact both

the family environment and the talent development environment can offer both protection from and susceptibility to mental health issues highlights the importance of the effectiveness of the relationships formed between the people within these environments. Recognising the inherent complexity within such issues, careful consideration must be given in managing these risk and protective factors. For example, recognising that the aim of talent development is to prepare an athlete for elite competition, itself inherently competitive and pressured (Jordet, 2009; Pensgaard & Roberts, 2000), a short-term reduction in competitive pressure may allay concerns for the athlete's wellbeing, yet may fail to adequately prepare an athlete for what lies ahead in the long term; thus potentially exposing them to even greater long-term risk. Conversely, it would be ethically wrong for talent development environments to ignore the consequences of any such short term pressures and compromise athlete wellbeing, just because they have an effective referral system that will pick up the pieces behind them.

Drawing on the results from Chapter 3 and in line with Objective 3, Chapter 5 sought to further examine key issues around the construct of fear of failure and its relationship with both other dual effect constructs and avoidance. Fear of failure was recognised as a multi-dimensional construct, whereby a fearful reaction to a perceived threat likely to cause shame, a reduction in one's self-estimate, uncertainty around future events, receipt of non-ego punishment or a reduction in social value (Conroy, 2001; Conroy et al., 2003; Conroy et al., 2002), results in a range of defensive behaviours. These defensive behaviours were classified into four types: reducing the achievement standard; avoidance; not trying or giving up; and exerting maximum effort (Birney et al., 1969; Sagar, Busch, & Jowett, 2010). Within talent development, success and failure were recognised to be defined within the contexts of winning and losing, or the quality of performances (Passer, 1983; Sagar & Lavallee, 2010).

Accordingly, in a talent development environment, poor performance outcomes and performance quality were likely to elicit fearful reactions in developing athletes; not in direct response to the failure itself, but rather to the associated consequences of failure. For example, competition losses may result in the administering of punishment by a coach (e.g., Bell et al., 2013; Hardy et al., 2013), or poor performances may be perceived to influence the likelihood of an individual being awarded a scholarship, thus creating uncertainty around their future. In such cases, defensive behaviours will be adopted in an attempt to mitigate these perceived (or very real!) consequences of failure. For instance, self-handicapping may likely protect a young athletes social standing; avoiding a task completely will remove the opportunity for failure; whilst maximum effort may be exerted in a bid to reduce the likelihood of failure. Despite such perceived protective qualities, each of these defensive behaviours will impact the efficacy of developmental interaction as described in Chapter 2. Avoidance, not trying or giving up, and reducing the achievement standard will all negatively impact upon this interaction process and therefore inhibit talent development. Conversely, exerting maximum effort could – for a short time, at least – facilitate more efficacious developmental interaction. Given the behavioural similarities between FF and other dual effect characteristics such as perfectionism and obsessive passion reported in Chapter 3, and the nature of the research methodology adopted, it is difficult to distinguish between these constructs. Given their established associations in existing literature (e.g., Conroy et al., 2007; Gustafsson et al., 2015; Sagar & Stoeber, 2009; Stoeber & Becker, 2008), they may even operate under the same mechanisms; i.e., a response to perceived threat. Accordingly, further research is recommended to qualitatively investigate the reasons why (as opposed to how) individuals adopt such behaviours.

As the first step in addressing Objectives 4 and 5, and based on the summary of findings presented in Chapter 6, Chapter 7 focused on the initial development and validation of the PCDEQ2. Following a process of item generation, expert reviews, cognitive interviews, pilot studies, and data collection, exploratory factor analysis on the results of the 135 item questionnaire yielded a 7 factor, 88 item solution. Examination of the items within each factor resulted in the following factor titles: *adverse response to failure, imagery and active preparation, self-directed control and management, perfectionistic tendencies, seeking and using social support, active coping*, and *clinical indicators.* This solution explained 40% of the variance accounted for, and it should be noted at this juncture that an explained variance of 40% is actually relatively low. However, it does find a level of consistency with that of the original PCDEQ, which explained 42% of the total variance (MacNamara & Collins, 2011). Furthermore, in their examination of reporting practices within EFA studies, Henson et al. (2004), almost 30% of the articles they studied explained less than 30% of the variance. In such a context, the variance accounted for by the PCDEQ2 seems reasonable, however, consideration must be given as to why it is not higher. First, due consideration must be given as to whether the items included in the study were inadequate. However, as these were drawn from both existing literature and the qualitative studies within this thesis, it was felt that the item generation phase was empirically and ecologically sound. Second, the process of EFA is a subjective one, with a range of sometimes contradictory criteria available to inform methodological decisions (e.g., determining the number of factors; Fabrigar & Wegener, 2012). Recognising that different decisions can lead to different results (MacNamara & Collins, 2011), care was taken to ensure that all relevant decisions were presented and justified accordingly. Third, issues associated with the participants themselves can impact upon the validity of responses. For example, given the judgemental nature of

talent development environments and the need for social acceptance amongst adolescents (see Chapters 5 and 4 respectively), there is potential for individuals to employ impression management strategies. Another issue associated with the participants is that they are – by definition – developing, and not the finished article. Given that PCDEs are a range of skills and behaviours that themselves are differentially developed and deployed over a period of time (MacNamara et al., 2010a, 2010b), and that both the PCDEQ and PCDEQ2 are designed to assess an *ideal* or *fully developed* set of attributes (MacNamara & Collins, 2011), it may be that the required attributes may be undeveloped or not yet apparent. This would be further exacerbated when considering the lack of emphasis placed on promoting psycho-behavioural characteristics within some talent development environments (Abbott & Collins, 2002, 2004), potentially impacting upon an individual's self-awareness in relation to their own possession and deployment of PCDEs. This would, in turn, offer some explanation towards the relatively low level of explained variance offered by the PCDEQ2.

Finally, Chapter 8 sought to address the final objectives by examining the discriminant function of the PCDEQ2; i.e., could it differentiate those likely to progress to elite level from those less likely to do so? Following discriminant function analysis, the PCDEQ2 was recognised to have correctly classified 72.9% of participants based on their responses. This compared similarly with – although admittedly marginally lower than – the original PCDEQ, which was sufficiently sensitive to classify 75% of team sport participants (MacNamara & Collins, 2013), and can therefore be deemed able to discriminate between the two groups effectively. The results of the DFA identified *active coping* as the largest contributor to group membership, closely followed by *adverse response to failure,* then *clinical indicators*, *self-directed control and management*, and *seeking and using social support* respectively. Following a Bonferroni adjustment, *perfectionistic tendencies* ceased to be significant in

determining group membership. This lack of significance is perhaps unsurprising when considering the highly correlative nature of both dimensions of perfectionism (Dunkley et al., 2003; Stoeber & Janssen, 2011), and that they only differentiate when the statistical overlap between both dimensions is controlled for (Gotwals et al., 2012; Stoeber, 2011). In an applied, real-world setting, therefore, both adaptive and maladaptive aspects are likely to occur concurrently, with little net effect. As the final construct, *imagery and active preparation* was shown not to discriminate between group membership. Not only this, but the results highlighted a small but not significant maladaptive contribution. This may be again explained by the differential deployment of PCDEs in relation to the assessment of fully developed attributes and the lack of promotion of PCDEs within talent development environments, as described above. Such a maladaptive contribution may also be as a result of individuals experiencing negative outcomes within their imagery practices (e.g., Taylor & Shaw, 2002), given the lack of specificity within the items contained within the PCDEQ2. Accordingly, future versions of the questionnaire may look to more accurately determine the nature of imagery outcomes. However, acknowledging the need for generality within the PCDEQ2 in order to be applicable in different team sport contexts, a more practical solution may be to cross-reference the scores for *imagery and active preparation* with those for *clinical indicators* and *adverse response to failure*, as a focus on negative outcomes within imagery is likely to be associated with an increase in anxiety and worries relating to failure. A key methodological weakness in validating the discriminant function of the PCDEQ2 is that it was validated using a cross-sectional approach; an approach necessitated by the constraints of a doctoral programme. Despite coaches offering predicted likelihood of progression, and even when considering that these coaches are usually the decision makers in respect to player progression and deselection (Christensen, 2009), the thesis' opening postulate was that current talent

identification and development systems suffer from poor levels of validity (Faber et al., 2015; McCarthy & Collins, 2014; Phillips et al., 2010; Vaeyens et al., 2008). Accordingly, the validity of these subjective rankings should be acknowledged. Furthermore, such subjectivity may be exacerbated by a lack of clearly defined, overt criteria against which to make decisions (see Collins & Hill, in press; Mascarenhas, Collins, Mortimer, & Morris, 2005). For example, as the data relating to members of the middle group (i.e., those scoring "3") of predicted progression were discarded, a lack of clear consensus as to what distinguishes a "2" from a "3", or a "3" from a "4", is likely to result in a range of type I and type II errors; all of which will affect the overall outcome. Such errors would go some way to explaining the discrepancy between its ability to predict low (85.8%) and high (44.3%) likelihood group memberships (see Table 8-2). Furthermore, given that around one third of the entire dataset was discarded, this could potentially have a very significant impact on results. In order to address these issues, a longitudinal approach would offer clear differentiation between groups; i.e., separating those who *did* make it from those who *didn't*.

9.3 General Discussion

Upon reviewing the rationale and findings of this thesis, and acknowledging its limitations, the PCDEQ2 provides an empirically based, ecologically validated psychometric assessment tool, that can effectively measure the key psycho-behavioural features required for effective talent development. Its psychometric properties are comparable with other such assessment tools already available to – and used within – talent development environments, such as the original PCDEQ. Given the vast array of psychometric tools available (see Chapter 6), and the equally large, if not larger, array of constructs that influence talent development, there is a clear and obvious need for a comprehensive assessment tool with a good level of practical utility; without such ease

of use, any assessment tool becomes redundant regardless of its psychometric properties. Accordingly, both the PCDEQ and the PCDEQ2 serve to assess a multitude of factors that influence development in a practical manner that can be readily integrated in to talent development programmes. However, where the PCDEQ2 stands apart from any other assessment tool of this kind, is that it seeks to assess characteristics that are adaptive *and* those that are maladaptive to the development process. As such factors are equally important (i.e., they all matter, albeit to different extents), failure to assess these negative attributes and those with a dual effect, can be considered as addressing only 'one side of the coin'.

9.3.1 Scope of the PCDEQ2

Given the PCDEQ2s potential ease of use, it is perhaps pertinent to consider the scope in which it should be employed. First and foremost, the PCDEQ2 is a formative assessment tool, and should be used as such. By assessing characteristics critical to effective development, the PCDEQ2 identifies areas that may require support. This is particularly important, given the evolving nature of PCDEs throughout development, and their differential deployment (MacNamara et al., 2010b), facilitating the design of effective and timely interventions. Equally, the PCDEQ2 can be used as a monitoring tool to assess the impact and effectiveness of such interactions, resulting in a change of questionnaire score. Yet, given its ability to discriminate between those athletes likely to progress to elite level and those less likely to, it may be tempting to use the PCDEQ2 as a form of screening or identification tool, whereby those athletes displaying the necessary psycho-behavioural characteristics are selected on to programmes, or conversely, those who do not display the required attributes are subsequently deselected. Such use of the questionnaire not only goes against the presented evidence and underpinning principles of talent development described throughout this thesis, but

also subjects itself to the same flaws of physiological and anthropometrical profiling; processes often applied within current TID systems, yet highly criticised for their lack of predictive validity and linear assumptions (Abbott & Collins, 2002; Collins & Bailey, 2013; Vaeyens et al., 2008). In much the same way, to use the PCDEQ2 as a panacea for assessing all things "talenty", would also be erroneous. As previously highlighted, the seven constituent factors are only able to account for 40% of the explained variance, suggesting that the measured psycho-behavioural characteristics are only part of the solution to a totally efficacious development process (theoretically, at least). Instead, the PCDEQ2 is perhaps best used as part of a triangulation process, reflecting the use of assessment tools in clinical settings, as reported in Chapter 4. Such triangulation would involve the PCDEQ2 results, along with other measures such as behavioural observations, expert opinion, and dialogue with the individual. As an important point of note, I would also explicitly state that despite the PCDEQ2 assessing elements of clinical issues, it is not – and was never intended to be – a diagnostic tool, and should not be used as such. In short, the PCDEQ2 is only one leg of the stool.

9.3.2 The PCDEQ2 and the Development of PCDEs

Within the wider context of developing athletes, measuring to what extent an individual possesses and deploys psychological characteristics is only the first step in improving developmental efficacy; what happens as a result of the information provided by the PCDEQ2 is critical. In line with the recommendations of MacNamara, Collins and colleagues (e.g., Abbott et al., 2005; Abbott & Collins, 2004; Collins & MacNamara, 2012; Collins et al., 2016; MacNamara, 2011; MacNamara et al., 2010b; MacNamara & Collins, 2015), talent development environments should seek to actively promote and develop PCDEs within individuals (and many actually do), and it is the *raison d'être* of the PCDEQ2 that is should be able to inform any such interventions.

However, at first inspection, there appears to be a significant discrepancy between the seven factors assessed by the PCDEQ2 and the 10 existing PCDEs recognised within the literature (cf. MacNamara, 2011). Such a discrepancy would make effective intervention design rather problematic. Accordingly, it is important to consider the PCDEQ2 factor structure in relation to the existing PCDEs.

Given their apparent contradictory positions, it is important to emphasise that the seven factor model is not intended to replace the existing PCDE structure as described in current literature, but rather, in acknowledging the item groupings following exploratory factor analysis, they reflect the way in which PCDEs were deployed. For example, the factor *active coping* consists of aspects of commitment, focus and distraction control, self-regulation, and goal setting, with each of these PCDEs contributing to the individual's ability to cope with the arduous nature of developmental challenge. In order to improve an individual's ability to proactively cope in such circumstances, therefore, each of these PCDEs can be targeted for intervention. Similarly, to improve a developing athlete's response to failure, the PCDEs of self-regulation, commitment, goal setting, and realistic performance evaluation would be likely targets for intervention. Table 9-1 offers a summary of each of the factors, and associated supporting PCDEs, although it is worth noting that due to their generic nature, this is unlikely to be exhaustive. Furthermore, the presence of the same PCDEs across different PCDEQ2 factors serves to highlight the overlap and interdependency between these PCDEs.

Table 9-1 Relationship between PCDEQ2 factors and existing PCDEs

PCDEQ2 Factor	Supporting PCDEs[1]
Adverse Response to Failure	Self-regulation
	Commitment
	Goal setting
	Realistic performance evaluation
	Coping with pressure
Imagery and Active Preparation	Imagery
	Goal setting
	Planning and organisation
	Focus and distraction control
Self-Directed Control and Management	Self-regulation
	Planning and organisation
	Goal setting
	Quality practice
Perfectionistic Tendencies	Self-regulation
	Realistic performance evaluation
	Goal setting
Seeking and Using Social Support	Creating and using support networks
	Self-regulation
	Realistic performance evaluation
	Planning and organisation
Active Coping	Commitment
	Focus and distraction control
	Quality practice
	Self-regulation
	Goal setting
Clinical Indicators[2]	Creating and using support networks
	Self-regulation

9.3.3 The PCDEQ2 and Applied Practice

For all its theoretical rationales, the supporting empirical evidence, the statistical analysis and subsequent validations, the efficacy of the PCDEQ2 will be forever at the mercy of its application in the real world. Barriers to practice such as available time,

[1] Adapted from MacNamara (2011) and MacNamara and Collins (2015)
[2] As discussed previously, clinical indicators primarily require the attention of clinical expertise, although support networks and self-regulation have been shown to offer some protection from risk (see Chapter 4)

ease of use, and comprehensibility of both the items within the questionnaire and its results, are all potentially able to negate its effectiveness. Acknowledging these barriers, it was important that the PCDEQ2 offered a practical solution to psychometric assessment in an applied setting. Accordingly, the 88 item questionnaire can reasonably be expected to be completed in under 30 minutes (based on completion times for the 135 item version, and trialled deployment of the final 88 item version), allowing it to fit into daily training schedules with relative ease. Furthermore, the PCDEQ2 can be completed either manually (i.e., pen and paper), or electronically on computers, tablets or mobile devices. Completing the questionnaire electronically also has the added benefit of being able to report the results in a variety of ways, such as numerically or graphically, facilitating easy interpretation of the data. However, none of this matters if the environment itself is not psychologically 'aware'.

Throughout this thesis we have dealt with the role psychology plays in negotiating developmental challenge; persistence-type characteristics provide the glue to stick to the challenge, while other characteristics mediate the response to this challenge in order to facilitate optimal adaptation. However, at no point have we stopped to consider the actual challenge itself. Rather, we have just assumed its efficacy. This is particularly important given that the nature of the challenge is likely to dictate the nature of any subsequent adaptation to it (Corbetta & Vereijken, 1999; Renshaw et al., 2012). Accordingly, further investigation into the developmental challenges faced by young athletes is required. Given the underpinning mechanisms described throughout this thesis, developmental challenge is likely to need to meet several criteria in order to be effective. First, the challenge needs to be targeted appropriately, in that it is expected to elicit a desired response. Such an approach is commonplace in coaching, with the implementation of constraints forcing individuals to act in different ways. For example, footballers may be challenged with a maximum

number of touches at any given point, in order to decrease the time they spend on the ball, and the speed with which they move it. Second, this challenge has to be pitched at an appropriate level. If it is too easy, it does not cause sufficient disruption; if it is too difficult, it may be unsurmountable. Third, the challenge needs to be individualised, in that it meets the needs and considerations of the individual, rather than any one-size-fits-all approach. Finally, the challenge needs to be timely. Does the athlete possess the attributes required to negotiate this challenge? Is this challenge in place in order to develop certain skills that will be required in the near future?

Recognising the complexities associated with prescribing developmental challenge in an efficacious way, a high degree of expertise within talent development environments is required, in order to deliver appropriate challenge. Accordingly, coaches, practitioners, and programme designers need to understand the mechanisms that drive talent development – in particular the role psychology plays as the key determinant of talent – in order to create a more psychologically aware environment. To do this, and echoing the sentiments discussed in Chapters 4 and 5, I would again underline the need for developing a professional judgement and decision making approach (see Martindale & Collins, 2005; Martindale & Collins, 2013) for key stakeholders, in order to underpin the deployment of such challenge. Not only this, but a shared understanding and representation (i.e., shared mental models; see Collins & Hill, in press; Mascarenhas & Smith, 2011) would facilitate greater integration of challenge and support across an inter-disciplinary talent development environment. This, in turn, would allow coaches, practitioners, and the wider talent development environment to effectively promote PCDEs.

9.4 Future Recommendations

In order to address the limitations recognised within this thesis, there are several key recommendations for future research. Given the practical limitations associated with a full-time PhD programme, a longitudinal study was not feasible at this point. Such an approach would, however, offer several key advantages over the cross-sectional methodology adopted. First, and most obviously, the longer timeframe would eradicate the need for subjective player progression ratings, thus eradicating the possibility of any type I and type II errors (i.e., false positives and false negatives, respectively) in group membership. In doing so, investigating the discriminate function of the PCDEQ2 would yield more valid results, as group membership would be clearly and objectively defined. Furthermore, the study would be able to utilise all available data, as progression would be binary, and no data would need to be discarded. Longitudinal study would also facilitate regular assessment over a period of time. By administering the PCDEQ2 regularly, the development and deployment of psycho-behavioural skills and attributes can be monitored. When combined with the eventual progression outcomes (rather than a predicted one), the data can subsequently be analysed to investigate any potential patterns in development and deployment, such as the phasing out of social support, or the extent to which different attributes are required at different phases of development. This in turn would allow development programmes to tailor their systems to ensure that any such developmental needs are appropriately met. In order to meet this need, future research should seek to establish the temporal stability of the PCDEQ2.

In developing the PCDEQ2, a deliberate decision was taken to delimit the study to male, academy-based team sports. This rationale acknowledged the impact different sport types can have on potential results, as demonstrated by MacNamara and Collins

(2013), with the decision taken to develop a questionnaire with strong validity for a specific domain, rather than a generic tool with wider appeal but potentially less validity. As such, the results reported throughout this thesis should be viewed in this context only, and any attempt to extrapolate to them to other sports in their current state would be spurious. However, the great utility of PCDEs lies within their generic nature, and a questionnaire that is only valid in one area of talent development (albeit a rather large one!) has limited scope. Accordingly, future research should seek to assess the PCDEQ2's validity in a variety of performance domains and across both genders, such as individual sports, music, dance, and potentially even business, through the process of confirmatory factor analysis. Any issues arising relating to relevant factors or appropriate item wording can subsequently be addressed in a domain-specific, more valid version. Conversely, the exploratory nature of the research design in developing the PCDEQ2 may have actually contributed to its relatively low explained variance, and that while steps were taken to delimit the study to male academy team sports (i.e., rugby union, rugby league, and football), there is a need to acknowledge the social and cultural differences between even these relatively similar domains. Consequently, further research should seek to establish to what extent differences exist between each of the sub-domains used within this study.

Within talent development research, the importance of psychological characteristics is increasingly being recognised. For example, research into relative age effect (RAE) within sports as wide-ranging as judo (Fukuda, 2015), tennis (Ulbricht, Fernandez-Fernandez, Mendez-Villanueva, & Ferrauti, 2015), women's ice hockey (Stenling & Holmström, 2014), football (Skorski, Skorski, Faude, Hammes, & Meyer, 2016), rugby union (McCarthy & Collins, 2014) and cricket (McCarthy, Collins, & Court, 2015) has demonstrated a systematic over-representation of quartile 1 and quartile 2 athletes entering talent development systems . This RAE is likely the result

of flawed talent identification systems assessing current performance levels (and therefore assuming linearity of development) rather than any measure of potential, be it deliberate or not. Consequently, given the contribution of physical and physiological components to sports performance, older – and therefore often more physically mature – athletes within a given year-group are likely perceived as more 'talented' by coaches and scouts (Furley & Memmert, 2016). However, as part of their longitudinal research into RAE, McCarthy and colleagues found that at the talent confirmation stage (i.e., the point of progression from development to elite level) RAE did not exist, and that the conversion rate of 'talented' athletes to elite performers was much higher in quartile 3 and quartile 4 athletes, than in those athletes over-represented coming into the system (McCarthy & Collins, 2014; McCarthy et al., 2015). Given this information, it was proposed that this reversal of RAE is due to the associated increase in developmental challenge for those at a potential performance disadvantage due to a lack of physical precocity, and that this challenge would potentially act as a catalyst for the development and deployment of psycho-behavioural characteristics and strategies (McCarthy & Collins, 2014). An absence of such challenge would therefore suggest that Q1 and Q2 athletes are less likely to require and develop such compensatory strategies. However, given the current lack of empirical evidence for such a hypothesis, the relationship between RAE and psychological characteristics currently remains a theoretical one. In order to provide empirical support to such an argument (or indeed to refute it), the PCDEQ2 would offer a valid and reliable measure of the psychological characteristics deployed by athletes transitioning to elite level, therefore facilitating an investigation into the extent which these PCDEs differ between athletes across the quartiles.

9.5 And Finally…

This thesis sought to examine the role of psychological characteristics and their associated behaviours on the talent development process. In doing so, the need to be able to effectively measure such issues became apparent. This need was subsequently addressed through the development and validation of the Psychological Characteristics of Developing Excellence Questionnaire version 2, an 88 item, seven factor psychometric tool, designed to measure the key constructs – both adaptive and maladaptive – that influence development efficacy. Accordingly, the PCDEQ2 offers coaches and practitioners alike the opportunity to formatively assess the true, key determinants of talent, to design effective and individualised interventions for their development based on such assessments, and measure the effectiveness of such interventions. As a consequence, coaches, practitioners, and programme managers alike are able to focus on what's important: getting better at getting better.

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APPENDICES

A. Chapter 3: Ethical Approval

28th October 2013

Aine MacNamara and Andrew Hill
School of Sports Tourism & the Outdoors
University of Central Lancashire

Dear Aine & Andrew

Re: BuSH Ethics Committee Application
Unique Reference Number: BuSH 207

The BuSH ethics committee has granted approval of your proposal application 'Examining the psycho-behaviourally based features of effective talent development'.

Please note that approval is granted up to the end of project date or for 5 years, whichever is the longer. This is on the assumption that the project does not significantly change, in which case, you should check whether further ethical clearance is required

We shall e-mail you a copy of the end-of-project report form to complete within a month of the anticipated date of project completion you specified on your application form. This should be completed, within 3 months, to complete the ethics governance procedures or, alternatively, an amended end-of-project date forwarded to roffice@uclan.ac.uk quoting your unique reference number.

Yours sincerely

Gill Thomson
Vice Chair
BuSH Ethics Committee

NB - Ethical approval is contingent on any health and safety checklists having been completed, and necessary approvals as a result of gained.

B. Chapter 3: Interview Guide

INTRO:

The purpose of this study is to examine the role of psycho-behaviourally based features of effective talent development. We are interested in the role that positive psychological characteristics play in developing excellence within Academy-based athletes. Furthermore, we are also interested in the potential negative effects of excessive use of such characteristics along with potential negative characteristics that may derail the talent development process. To do this, we will conduct an interview and ask you a series of open-ended questions based upon your own experiences of developing elite athletes.

Section 1: Description of successful athletes and comparisons to less successful peers

First of all I'd like to ask you some questions based upon your experiences and knowledge of developing athletes who have successfully made the transition to elite performance. I am very interested to see if there were specific characteristics that contributed positively to their development.

QUESTION: Can you describe players who have successfully made it through the system to elite senior level?

PROBES: What characterises these players? (e.g., PCDEs, Growth Mindset)

What are the psychological characteristics that impacted upon the athletes' development?

Give me some examples of behaviours and attitudes that typified these characteristics within these athletes?

How do you think these positive characteristics contributed to their development and to achieving long-term success? (i.e., impact upon training, performance and personal conduct?)

I am also interested in how these behaviours, attitudes and characteristics may have differed in comparison to their less successful peers. I would like to talk about your experiences with these athletes, looking at why some succeeded and others did not.

QUESTION: **How do these behaviours and characteristics differ from other athletes who have not gone on to be successful at elite level? How did these successful athletes differ from their less successful counterparts?**

PROBES: **What characteristics make them stand out from their peers as potential elite athletes?**

What do the less-successful athletes do differently?

What are the consequences of these behaviours and attitudes in the less-successful players? (i.e., impact upon training, performance and personal conduct?)

Section 2: Characteristics and behaviours taken to excess

I am interested in the potential downsides of such positive characteristics. In this section I would like to discuss your experiences of athletes taking behaviours to excess.

QUESTION: **Can you describe examples of when athletes have taken positive characteristics to excess, or perhaps applied them inappropriately?**

PROBES: **When is this a problem, in your experience?**

QUESTION: **What are the consequences of such excessive behaviours and characteristics?**

PROBES: **How do they impact on an athlete's training? (e.g., motivation, engagement)**

How do they impact upon performance?

How do they impact upon the athlete's behaviour?

Section 3: Potentially negative characteristics

Having looked at the role of positive characteristics on talent development and their application, I am interested in finding out about potentially negative characteristics,

behaviours and attitudes that may act as barriers to successful development. I would like to talk about your past experiences with developing athletes and the psychological characteristics that may have hindered their development.

QUESTION: What do you think are the factors that stop an athlete making the most of their ability?

PROBES: Can you give me some examples?

How do these factors limit the athlete's development? / ability to cope / make the most of opportunities?

Have mental health issues negatively impacted upon an athlete's development? If so, how?

Section 4: Developmental Success

I'd like to talk about the developmental process within the Academy, and I'm particularly interested in potential causes of successful and unsuccessful development.

QUESTION: If I were to trace these aspiring elite athletes through their development, where do you feel goes wrong?

PROBES: Is there a commonality between the athletes not "making it"?

How early in the system does it become apparent that these athletes won't be successful elites?

Are there any examples of "dark horses" or "late developers" who have not expressed talent early on but towards the latter stages of development have gone on to develop rapidly and successfully?

Why do you think this is?

How do you allow for this late development?

And finally, before we conclude this interview…

QUESTION: Is there any further information you'd like to add on any of the previous sections, or a question that would be beneficial but I haven't thought to ask?

C. Chapter 4: Ethical Approval

uclan
University of Central Lancashire

7th October 2014

Aine MacNamara and Andrew Hill
School of Sports Tourism & the Outdoors
University of Central Lancashire

Dear Aine & Andrew

Re: BAHSS Ethics Committee Application
Unique Reference Number: BAHSS 205

The BAHSS ethics committee has granted approval of your proposal application 'Examining the psycho-behaviourally based features of effective talent development: an investigation of clinical issues'. Approval is granted up to the end of project date* or for 5 years from the date of this letter, whichever is the longer.

It is your responsibility to ensure that

- the project is carried out in line with the information provided in the forms you have submitted
- you regularly re-consider the ethical issues that may be raised in generating and analysing your data
- any proposed amendments/changes to the project are raised with, and approved, by Committee
- you notify roffice@uclan.ac.uk if the end date changes or the project does not start
- serious adverse events that occur from the project are reported to Committee
- a closure report is submitted to complete the ethics governance procedures (Existing paperwork can be used for this purposes e.g. funder's end of grant report; abstract for student award or NRES final report. If none of these are available use e-Ethics Closure Report Proforma).

Yours sincerely

Peter Herissone-Kelly
Chair
BAHSS Ethics Committee

D. Chapter 4: Interview Guide

INTRO:

The purpose of this study is to examine the psycho-behaviourally based features of effective talent development within sport. We are particularly interested in the role that clinical and mental health issues play, and their impact upon both the athlete and the broader development process. To do this, we will conduct an interview and ask you a series of open-ended questions based upon your own experiences with adolescents as developing athletes.

Background: Age, Experience, Qualifications etc.

Section 1: Description of apparent clinical issues in the TD setting

First of all I'd like to ask you some questions based upon your experiences with developing athletes as to the types of issues that are presented. I am particularly interested to find out how these impacted upon their development both personally and as a potential elite athlete.

QUESTION: Based on your experience, can you describe the types of issues that have been presented in developing athletes?

PROBES: What symptoms/presentations are associated with these issues?
Are some more prevalent than others? Is there a reason for this?
Can you describe an example of how these issues impact upon the development process and the athlete's day-to-day life, both in and out of sport?
What are the consequences of not addressing these issues?
Are these issues manageable over an athlete's development?
Are some of these issues likely to lead to the premature derailment of an individual's sporting career? If so, how?

Section 2: Risk factors associated with talent development and high-achievers

In this section I'd like to discuss the types of risk factors associated with talent development environments and processes and the demands they may place on an individual, and also the types of issues associated with the characteristics of those who populate these environments, i.e. high achieving adolescents.

QUESTION: In your experience, does sport, and in particular talent development, bring with it any particular inherent risk factors that may make a developing athlete more susceptible to clinical issues?

PROBES: Can you describe examples of these inherent risk factors?

Does the 'system' play a role, either positively or negatively? If so, How?

How might these risk factors and their subsequent associated issues impact upon both an individual's mental health and their development as an athlete?

QUESTION: Do talent development environments offer a protective element to high achieving adolescents?

PROBES: What protective factors do they offer?

Can you describe examples of this in action?

Are these factors only available through TDEs or also through other ways?

QUESTION: In your experience, what types of mental health issues tend to be associated with high achieving adolescents, in particular within a sporting environment?

PROBES: Can you describe examples of where these have impacted upon an athlete's development, either personally or professionally?

In your opinion, are there steps that can be taken by clubs, academies and other talent development environments to mediate any such issues?

Section 3: Identification of potential clinical issues within an applied setting

In this final section, I'd like to talk about the process of identifying issues within these athletes, the 'nuts and bolts' if you will. I am particularly interested in where (if) these processes are potentially inadequate, potential improvements and examples of good practice.

QUESTION: What observable behaviours might give you cause for concern in a developing athlete? How would you screen for it?

PROBES: What characteristics would make an individual stand out within a TDE as potentially requiring support?
Do these behaviours have multiple causes?
Would such behaviours be easily observable by untrained individuals or those with a limited understanding of clinical issues?
Is there a role for assessment tools such as the PHQ-9 or GAD-7? Are they useful in a talent development setting? Are other tools available and/or used?

QUESTION: How does the referral process work? Do clients approach you directly or are they referred by, for example, club doctors, coaches, GPs, parents, etc.?

PROBES: Is this process effective?
Do you feel that athletes may not be being identified as needing specialist help? If so, how are they falling through the net?
How could this process be improved to address these issues?

And finally, before we conclude this interview…

QUESTION: Is there any further information you'd like to add on any of the previous sections, or a question that would be beneficial but I haven't thought to ask?

E. Chapter 7: Ethical Approval

30 July 2015

Aíne MacNamara / Andrew Hill
School of Sport, Tourism and The Outdoors
University of Central Lancashire

Dear Aíne / Andrew

Re: BAHSS Ethics Committee Application
Unique Reference Number: BAHSS 276

The BAHSS ethics committee has granted approval of your proposal application '**Examining the psycho-behaviourally based features of effective talent development: an investigation of clinical issues'.** Approval is granted up to the end of project date* or for 5 years from the date of this letter, whichever is the longer.

It is your responsibility to ensure that

- the project is carried out in line with the information provided in the forms you have submitted
- you regularly re-consider the ethical issues that may be raised in generating and analysing your data
- any proposed amendments/changes to the project are raised with, and approved, by Committee
- you notify roffice@uclan.ac.uk if the end date changes or the project does not start
- serious adverse events that occur from the project are reported to Committee
- a closure report is submitted to complete the ethics governance procedures (Existing paperwork can be used for this purposes e.g. funder's end of grant report; abstract for student award or NRES final report. If none of these are available use e-Ethics Closure Report Proforma).

Yours sincerely

Peter Herissone-Kelly
Chair
BAHSS Ethics Committee

F. Chapter 7: 173 Item PCDEQ2

Factor	Item
Resilience	When I fail at a task, I'm happier to move on to something else instead
	I think of myself as a mentally strong person
	Whether I fail or succeed, I can depend on the people around me
	The day-to-day setbacks can often get me down
	I like to take control when dealing with problems
	I tend to bounce back after injury, illness or hardship
	I can deal with whatever comes my way
	When things seem hopeless, I still keep going
	I am able to adapt and change when things aren’t going right for me
	I enjoy challenging situations
Self-Regulation and Self-Control	I find it easy to break habit
	when we need to work hard I am first in the queue
	I often do things I know I shouldn't do
	I push myself to do extra
	I am good at resisting temptation
	I have a hard time breaking bad habits
	I am lazy
	I do certain things that are bad for me if they are fun
	I wish I had more discipline
	I am able to work effectively on long term goals
	I often act without thinking through all the alternatives

	People would say that I have iron self-discipline
Goal Setting and Self-Reinforcement	I usually reward myself for achieving my goals
	I keep going knowing that my hard work will be rewarded in the long term
	If I encounter a problem I make a plan to get around it
	I am happy to wait for my efforts to pay off
	When things go wrong, I find it difficult to see a way forwards
	I regularly set clear targets for myself
	When I succeed at small tasks, it encourages me to keep going
	If I make a mistake I dwell it and can't see the big picture
	I gives myself treats even when I don't achieve my goals
	When I do something well, I take time to enjoy the feeling it gives me
Creating and Using Support Networks	I often seek advice from different people
	I know where to turn to for help
	I value and use the opinion of others about my performance
	When faced with a problem there is no one I can ask to help
	If I don't know something, I will find out who to ask
	I am keen to ask other people for help
	Asking other people for help is a sign of weakness
	I have a range of people I can talk to for advice about my performance
	I dislike asking people for help and advice
	I have developed a very supportive group of friends
	I listen and learn from the people around me
Perfectionism	I am never happy with my performance
	It is not important that people I am close to are successful
	When working on something, I cannot relax until it is perfect

	The people around me expect me to be perfect at everything I do
	I must always perform at my best
	It really upsets me when people don't try their hardest
	I must always be a winner in my sport
	Although they may not say it, other people get upset when I make mistakes
	I can't be bothered with people who don't always strive to better themselves
	People around me expect me to be perfect
	The better I do, the better I am expected to do
Obsessive Passion	My mood depends entirely on my sporting success
	I cannot imagine life without my sport
	I have obsessive feeling for my sport
	Sporting success reflects the qualities important to me
	I cannot live without my sport
	I enjoy doing activities not related to my sport
	Even when I am not playing my sport, I have to do something related to it
	My sport has given me my most memorable experiences
	I have other hobbies away from my sport
	If I don’t give my sport all of my attention, all of the time, my performances will suffer
Anxiety-type Behaviours	I often feel nervous
	I tend not to worry about things
	I find it easy to relax
	I often worry that bad things will happen
	I get annoyed very easily
	I often feel the need to recheck things several times
	I find it difficult to control my thoughts

	I always have to do certain things in a specific order
	I have a lot of superstitions and rituals
	My preparation for competition has to be exactly the same each time
Changes in Behaviour	My teammates would describe me as a consistent person
	Recently my behaviour has changed significantly
	I socially with my teammates much less than I used to
	My coaches feel that I have become quite disruptive
	My coaches complain that my behaviour isn't as good as it used to be
	I have lost interest in socialising with my training group
	I feel like I have lost the will and energy to train and compete
	I now don't have many friends in my training group
	Coaches complain that my attitude has recently changed
Depressive Symptoms	I regularly feel tired and have little energy
	I normally find it easy to concentrate
	I sometimes feel down without really knowing why
	I struggle to get myself motivated
	I don't often enjoy playing my sport
	I tend not to dwell on past events
	I tend to run through things over and over again
	My sleep is often disturbed by worrisome thoughts
	I often lie awake at night thinking things over and over
	I often find it hard to talk to other people about things that are bothering me
Eating Disorders	I feel the cold easily
	I always have plenty of energy
	I worry about putting weight on

	I often restrict my eating to influence my body shape
	I am happy with how my body looks
	I worry about other people seeing me eat
	After eating, I sometimes feel guilty about its effect on my body shape
	I am happy with my weight
	I feel uncomfortable with other people seeing my body
	I often wear baggy clothing to hide my body shape
	I feel uncomfortable eating in communal areas
	I often lack energy
	Compared to my teammates I often fail to complete a heavy training session
Fear of Failure	When I am failing, I worry most about what others think about me
	When I am not succeeding, I feel like people lose interest in me
	When I am failing, significant others are often disappointed in me
	When things are not going well, I get worried about what other people will think
	When I am failing at something, I hate the fact that I am not in control of the outcome
	When things are going badly for me, I am not worried that it will affect my future plans
	I would rather not attempt something than risk getting it wrong
	When I fail, people are less interested in me
	When I am failing, I am afraid I might not have what it takes
	I don’t mind making mistakes especially when trying something new
	When things are going wrong for me, my future seems uncertain
	I have to work harder than my peers to achieve success
Imagery	I use imagery to improve my physical performance
	Before attempting a skill, I imagine myself performing it
	I incorporate mental rehearsal in my practice

	I use mental rehearsing to focuses me on what I have to do
	I regularly imagine what a good performance feels like
	Before I arrive at a performance venue I mentally rehearse my performance there
	I imagine myself handling the arousal and excitement associated with competition
	I include imagery in my preparation
	I imagine coping with setbacks
	When I have to do something that worries me, I imagine how I will overcome my anxieties and perform successfully
	I like to try things out in my head first
Focus and Distraction Control	I get distracted thinking about how other performers are doing
	If something unexpected happens I find it really hard to adapt
	I find it hard to stop my sport suffering when I am under pressure from other things in my life
	I often stop trying when I find a task difficult
	Even minor setbacks disturb my focus
	When I make a mistake I find it difficult to get my focus back on task
	I find it hard to push myself to overcome difficulties
	I find it difficult to overcome my feelings of anxiety when I perform
	I often keep thinking about the mistakes I have made and let this interfere with my performance
Quality Practice	I get on with what I have to do even if no one is watching
	I am willing to push myself really hard
	All the practice that I do gives me confidence in my ability to succeed
	During practice I block out distracting thoughts and focus my attention completely on what needs to be done
	I prepare carefully for training sessions
	I focus on what I have to get done in practice sessions
	I set myself challenging goals that I have to work hard to achieve
Realistic Performance	I am always looking for ways to improve

Evaluation and Attribution	I always have at least one goal that I am working towards
	After a performance, I review my performance in my head to figure out what I did right and wrong
	I analyse my performances to find out what I did well and what I did badly
	I would usually blame other people or circumstances for failure
	I often feel let down by my teammates
	Whether I win or lose influences my evaluation of my performance
	I only feel happy when I win
	I feel in control of my own performance
	I often feel let down by my coaches
	I consider my weaknesses and work hard on these in practice
Planning and Organisation	I carefully plan and monitor the steps essential to my progress
	My life is well organised
	I often forget appointments or timings
	I sometimes forget items of equipment
	My life is organised around my sport commitments
	I plan my day carefully around my training or performance commitments
	I have a carefully thought out plan of my pathway to the top
	I can clearly see my pathway to the top
Commitment and Role Clarity	I know exactly what is expected by me of my coaches
	I am completely committed to success at my sport
	I work through set backs
	Failures do not distract me from my pathway to success
	I take time to clarify what is required
	I know what those around me want from me
	I clarify others expectations of me

I know who to go to to get things done	
I am able to commit completely to my sport	

G. Chapter 7: Cognitive Interview Guide

PCDEQ2 Development: Cognitive Interviews

DATE: _____

LOCATION: _____

PLAYER ID: _____

SECTION: _____

OBSERVATION NOTES

- **Did the participant identify any words or items as unclear, confusing, hard to understand or requiring more explanation?**

YES ☐ **NO** ☐

DETAILS:

_____

_____

_____

_____

_____

OTHER OBSERVATIONS:

_____

_____

_____

_____

_____

_____

QUESTIONS:

- **Were the instructions helpful in answering the questions?**
- **Were you able to answer all the questions in this section?**
- **If not, which ones were you unable to answer?**
- **How did you decide on your answer for item X?**
- **What do you think XX means?**
- **Can you phrase question X in your own words?**
- **Did your answers always fit in the response scale?**
- **Were there any questions in this section you feel did not apply to you?**
- **I noticed you took a long time to answer question X; what were you thinking about?**
- **You seemed to look a little puzzled when answering question X; why was that?**
- **I noticed you changed your answer on question X – what made you change your mind?**

COMMENTS:

H. Chapter 7: 135 Item PCDEQ2

Factor	Item
Resilience	I am able to adapt and change when things aren’t going right for me
	I can deal with whatever comes my way
	Whether I fail or succeed, I can depend on the people around me
	When I fail at a task, I'm happier to move on to something else instead
	I think of myself as a mentally strong person
	When things seem hopeless, I still keep going
	I like to take control when dealing with problems
	The day-to-day setbacks can often get me down
Self-Regulation and Self-Control	I do certain things that are bad for me if they are fun
	I am good at resisting temptation
	I often do things I know I shouldn't do
	When we need to work hard I am first in the queue
	I wish I had more discipline
	People would say that I am very self-disciplined
	I have a hard time breaking bad habits
	I am lazy
	I often act without thinking through all the alternatives
	I find it easy to break habits
Goal Setting and Self-Reinforcement	I am happy to wait for my efforts to pay off
	I usually reward myself for achieving my goals
	I work through set backs

	When I do something well, I take time to enjoy the feeling it gives me
	I regularly set clear targets for myself
	If I make a mistake I dwell on it and can't see the big picture
	When things go wrong, I find it difficult to see a way forwards
	I give myself treats even when I don't achieve my goals
Creating and Using Support Networks	I dislike asking people for help and advice
	When faced with a problem there is no one I can ask to help
	If I don't know something, I will find out who to ask
	I often seek advice from different people
	I value and use the opinion of others about my performance
	I think asking other people for help is a sign of weakness
	I am keen to ask other people for help
Perfectionism	It is not important that people I am close to are successful
	When working on something, I cannot relax until it is perfect
	The people around me expect me to be perfect at everything I do
	I am never happy with my performance
	It really upsets me when people don't try their hardest
	People around me expect me to be perfect
	Although they may not say it, other people get upset when I make mistakes
	I can't be bothered with people who don't always strive to better themselves
Obsessive Passion	I enjoy doing activities not related to my sport
	If I don’t give my sport all of my attention, all of the time, my performances will suffer
	I have other hobbies away from my sport
	My mood depends entirely on my sporting success
	Even when I am not playing my sport, I have to do something related to it

Anxiety-type Behaviours	I have a lot of superstitions and rituals
	I get annoyed very easily
	I often feel the need to recheck things several times
	I often feel nervous
	I find it difficult to control my thoughts
	I often worry that bad things will happen
	My preparation for competition has to be exactly the same each time
	I find it easy to relax
	I always have to do certain things in a specific order
	I tend not to worry about things
Changes in Behaviour	Coaches complain that my attitude has recently changed
	Recently my behaviour has changed significantly
	My teammates would describe me as a consistent person
	I socialise with my teammates much less than I used to
	I have lost interest in socialising with my training group
Depressive Symptoms	I tend not to dwell on past events
	My sleep is often disturbed by worrisome thoughts
	I often lie awake at night thinking things over and over
	I tend to run through things over and over again
	I sometimes feel down without really knowing why
	I often find it hard to talk to other people about things that are bothering me
	I normally find it easy to concentrate
	I struggle to get myself motivated
	I feel tired and have little energy more often than my peers
Eating Disorders	I often lack energy

	I feel the cold easily
	I feel uncomfortable eating in front of other people
	I worry about putting weight on
	I always have plenty of energy
	After eating, I sometimes feel guilty about its effect on my body shape
	Compared to my teammates I often fail to complete a heavy training session
	I feel uncomfortable with other people seeing my body
	I often restrict my eating to influence my body shape
Fear of Failure	When I fail, people are less interested in me
	When I am failing, significant others are often disappointed in me
	When I am not succeeding, I feel like people lose interest in me
	When things are not going well, I get worried about what other people will think
	When things are going badly for me, I am not worried that it will affect my future plans
	When I am failing, I am afraid I might not have what it takes
	When things are going wrong for me, my future seems uncertain
	When I am failing at something, I hate the fact that I am not in control of the outcome
	When I am failing, I worry most about what others think about me
	I don't mind making mistakes, especially when trying something new
	I would rather not attempt something than risk getting it wrong
Imagery	I include imagery in my preparation
	When I have to do something that worries me, I imagine how I will overcome my anxieties and perform successfully
	Before attempting a skill, I imagine myself performing it
	I incorporate mental rehearsal in my practice
	Before I arrive at a performance venue, I mentally rehearse my performance there

	I imagine myself handling the arousal and excitement associated with competition
	I regularly imagine what a good performance feels like
	I like to try things out in my head first
	I use imagery to improve my physical performance
	I imagine coping with setbacks
	I use mental rehearsing to focus myself on what I have to do
Focus and Distraction Control	Even minor setbacks disturb my focus
	I find it hard to push myself to overcome difficulties
	I often keep thinking about the mistakes I have made and let this interfere with my performance
	I find it difficult to overcome my feelings of anxiety when I perform
	If something unexpected happens I find it really hard to adapt
	When I make a mistake I find it difficult to get my focus back on task
	I often stop trying when I find a task difficult
	I find it hard to stop my sport suffering when I am under pressure from other things in my life
	I get distracted thinking about how other performers are doing
Quality Practice	I set myself challenging goals that I have to work hard to achieve
	All the practice that I do gives me confidence in my ability to succeed
	During practice I block out distracting thoughts and focus my attention completely on what needs to be done
	I prepare carefully for training sessions
Realistic Performance Evaluation and Attribution	I analyse my performances to find out what I did well and what I did badly
	I feel in control of my own performance
	I only feel happy when I win
	I often feel let down by my coaches
	Whether I win or lose influences my evaluation of my performance

	I would usually blame other people or circumstances for failure
	I often feel let down by my teammates
	I consider my weaknesses and work hard on these in practice
Planning and Organisation	I carefully plan and monitor the steps essential to my progress
	I sometimes forget items of equipment
	I have a carefully thought out plan of my pathway to the top
	I often forget appointments or timings
	My life is well organised
	I can clearly see my pathway to the top
Commitment and Role Clarity	I know what those around me want from me
	Failures do not distract me from my pathway to success
	If I encounter a problem I make a plan to get around it
	I take time to clarify what is required
	I know who to go to to get things done
	I know exactly what is expected by me of my coaches
	I like clarify what other people expect of me

I. Chapter 8: 88 Item PCDEQ2

Factor	Items
Factor 1	Even minor setbacks disturb my focus
Adverse Response to	I often keep thinking about the mistakes I have made and let this interfere with my performance
Failure	When I am not succeeding, I feel like people lose interest in me
(21 Items)	When things are not going well, I get worried about what other people will think
	I often feel nervous
	I find it difficult to overcome my feelings of anxiety when I perform
	I often worry that bad things will happen
	My sleep is often disturbed by worrisome thoughts
	I often lie awake at night thinking things over and over
	I sometimes feel down without really knowing why
	When I am failing, I am afraid I might not have what it takes
	If I make a mistake I dwell on it and can't see the big picture
	When I make a mistake I find it difficult to get my focus back on task
	When things are going wrong for me, my future seems uncertain
	Although they may not say it, other people get upset when I make mistakes
	When I am failing at something, I hate the fact that I am not in control of the outcome
	When I am failing, I worry most about what others think about me
	I get distracted thinking about how other performers are doing
	The day-to-day setbacks can often get me down
	When things go wrong, I find it difficult to see a way forwards
	I tend not to worry about things

Factor 2 Imagery and Active Preparation (15 Items)	I include imagery in my preparation When I have to do something that worries me, I imagine how I will overcome my anxieties and perform successfully Before attempting a skill, I imagine myself performing it I incorporate mental rehearsal in my practice Before I arrive at a performance venue, I mentally rehearse my performance there I tend to run through things over and over again I take time to clarify what is required I regularly imagine what a good performance feels like I regularly set clear targets for myself I have a carefully thought out plan of my pathway to the top I like to try things out in my head first I use imagery to improve my physical performance I imagine coping with setbacks I can clearly see my pathway to the top I use mental rehearsing to focus myself on what I have to do
Factor 3 Self-Directed Control and Management (14 Items)	I do certain things that are bad for me if they are fun I am good at resisting temptation I sometimes forget items of equipment I would usually blame other people or circumstances for failure I often forget appointments or timings I often do things I know I shouldn't do I prepare carefully for training sessions My life is well organised I wish I had more discipline People would say that I am very self-disciplined

	I have a hard time breaking bad habits
	I am lazy
	I often act without thinking through all the alternatives
	I give myself treats even when I don't achieve my goals
Factor 4	When I fail, people are less interested in me
Perfectionistic	When I am failing, significant others are often disappointed in me
Tendencies	I get annoyed very easily
(10 Items)	The people around me expect me to be perfect at everything I do
	If I don’t give my sport all of my attention, all of the time, my performances will suffer
	I only feel happy when I win
	People around me expect me to be perfect
	I can't be bothered with people who don't always strive to better themselves
	My preparation for competition has to be exactly the same each time
	My mood depends entirely on my sporting success
Factor 5	I dislike asking people for help and advice
Seeking and Using	When faced with a problem there is no one I can ask to help
Social Support	If I don't know something, I will find out who to ask
(9 Items)	I often find it hard to talk to other people about things that are bothering me
	I know who to go to to get things done
	I often seek advice from different people
	I value and use the opinion of others about my performance
	I think asking other people for help is a sign of weakness
	I am keen to ask other people for help
Factor 6	I find it hard to push myself to overcome difficulties
Active Coping	I am able to adapt and change when things aren’t going right for me

(10 Items)	Failures do not distract me from my pathway to success
	I can deal with whatever comes my way
	My teammates would describe me as a consistent person
	If I encounter a problem I make a plan to get around it
	I work through set backs
	When we need to work hard I am first in the queue
	When things seem hopeless, I still keep going
	I like to take control when dealing with problems
Factor 7	I often lack energy
Clinical Indicators	I socialise with my teammates much less than I used to
(9 Items)	If something unexpected happens I find it really hard to adapt
	I worry about putting weight on
	I have lost interest in socialising with my training group
	After eating, I sometimes feel guilty about its effect on my body shape
	Compared to my teammates I often fail to complete a heavy training session
	I struggle to get myself motivated
	I feel tired and have little energy more often than my peers

J. Chapter 8: Subjective Player Rating Form

INVESTIGATING THE DISCRIMINATN FUNCTION OF THE PCDEQ2

Based on your own experience and views, please rate the likelihood of progression to elite sport, for each of the athletes that completed the PCDEQ2.

These ratings will remain confidential at all times.

* Player IDs are composed of your club code, followed by player initials and 6-digit date of birth

Player ID*	**1. Extremely Unlikely**	**2. Unlikely**	**3. Neutral**	**4. Likely**	**5. Extremely Likely**

* Player IDs are composed of your club code, followed by player initials and 6-digit date of birth

K. Paper-Based Version of Final PCDEQ2

Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

NAME: _____

DATE OF BIRTH: _____

1. I often seek advice from different people

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

2. The people around me expect me to be perfect at everything I do

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

3. When things are going wrong for me, my future seems uncertain

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

4. I often act without thinking through all the alternatives

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

5. Although they may not say it, other people get upset when I make mistakes

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

6. When we need to work hard I am first in the queue

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

7. I often lie awake at night thinking things over and over

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

8. I value and use the opinion of others about my performance

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

9. I include imagery in my preparation

Very unlike me ○ ○ ○ ○ ○ ○ Very like me

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University of Central Lancashire

Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

10. If I encounter a problem I make a plan to get around it
Very unlike me — Very like me
O O O O O O

11. I know who to go to to get things done
Very unlike me — Very like me
O O O O O O

12. I like to take control when dealing with problems
Very unlike me — Very like me
O O O O O O

13. After eating, I sometimes feel guilty about its effect on my body shape
Very unlike me — Very like me
O O O O O O

14. I can deal with whatever comes my way
Very unlike me — Very like me
O O O O O O

15. I use imagery to improve my physical performance
Very unlike me — Very like me
O O O O O O

16. I am able to adapt and change when things aren't going right for me
Very unlike me — Very like me
O O O O O O

17. The day-to-day setbacks can often get me down
Very unlike me — Very like me
O O O O O O

18. I am keen to ask other people for help
Very unlike me — Very like me
O O O O O O

19. I often lack energy
Very unlike me — Very like me
O O O O O O

20. My preparation for competition has to be exactly the same each time
Very unlike me — Very like me
O O O O O O

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University of Central Lancashire

Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

21. My sleep is often disturbed by worrisome thoughts
Very unlike me — Very like me
O O O O O O

22. Even minor setbacks disturb my focus
Very unlike me — Very like me
O O O O O O

23. I have a carefully thought out plan of my pathway to the top
Very unlike me — Very like me
O O O O O O

24. I imagine coping with setbacks
Very unlike me — Very like me
O O O O O O

25. I regularly imagine what a good performance feels like
Very unlike me — Very like me
O O O O O O

26. If I don't know something, I will find out who to ask
Very unlike me — Very like me
O O O O O O

27. When I am failing at something, I hate the fact that I am not in control of the outcome
Very unlike me — Very like me
O O O O O O

28. I often worry that bad things will happen
Very unlike me — Very like me
O O O O O O

29. My life is well organised
Very unlike me — Very like me
O O O O O O

30. I give myself treats even when I don't achieve my goals
Very unlike me — Very like me
O O O O O O

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University of Central Lancashire

Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

31. People would say that I am very self-disciplined
Very unlike me — Very like me
O O O O O O

32. I regularly set clear targets for myself
Very unlike me — Very like me
O O O O O O

33. I like to try things out in my head first
Very unlike me — Very like me
O O O O O O

34. When I fail, people are less interested in me
Very unlike me — Very like me
O O O O O O

35. I sometimes forget items of equipment
Very unlike me — Very like me
O O O O O O

36. I think asking other people for help is a sign of weakness
Very unlike me — Very like me
O O O O O O

37. I often keep thinking about the mistakes I have made and let this interfere with my performance
Very unlike me — Very like me
O O O O O O

38. I worry about putting weight on
Very unlike me — Very like me
O O O O O O

39. I would usually blame other people or circumstances for failure
Very unlike me — Very like me
O O O O O O

40. I find it difficult to overcome my feelings of anxiety when I perform
Very unlike me — Very like me
O O O O O O

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University of Central Lancashire

Psychological Characteristics of Developing Excellence Questionnaire v.2

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41. If I don't give my sport all of my attention, all of the time, my performances will suffer

Very unlike me | Very like me

O O O O O O

42. When things go wrong, I find it difficult to see a way forwards

Very unlike me | Very like me

O O O O O O

43. I only feel happy when I win

Very unlike me | Very like me

O O O O O O

44. I use mental rehearsing to focus myself on what I have to do

Very unlike me | Very like me

O O O O O O

45. I often find it hard to talk to other people about things that are bothering me

Very unlike me | Very like me

O O O O O O

46. When things are not going well, I get worried about what other people will think

Very unlike me | Very like me

O O O O O O

47. I am lazy

Very unlike me | Very like me

O O O O O O

48. The day-to-day setbacks can often get me down

Very unlike me | Very like me

O O O O O O

49. If something unexpected happens I find it really hard to adapt

Very unlike me | Very like me

O O O O O O

50. I find it hard to push myself to overcome difficulties

Very unlike me | Very like me

O O O O O O

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Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

51. I am good at resisting temptation

Very unlike me | Very like me

O O O O O O

52. When faced with a problem there is no one I can ask to help

Very unlike me | Very like me

O O O O O O

53. If I make a mistake I dwell on it and can't see the big picture

Very unlike me | Very like me

O O O O O O

54. I socialise with my teammates much less than I used to

Very unlike me | Very like me

O O O O O O

55. I often do things I know I shouldn't do

Very unlike me | Very like me

O O O O O O

56. I can't be bothered with people who don't always strive to better themselves

Very unlike me | Very like me

O O O O O O

57. Failures do not distract me from my pathway to success

Very unlike me | Very like me

O O O O O O

58. I can clearly see my pathway to the top

Very unlike me | Very like me

O O O O O O

59. I take time to clarify what is required

Very unlike me | Very like me

O O O O O O

60. I often forget appointments or timings

Very unlike me | Very like me

O O O O O O

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University of Central Lancashire

Psychological Characteristics of Developing Excellence Questionnaire v.2

University of Central Lancashire

61. When I am not succeeding, I feel like people lose interest in me
Very unlike me Very like me
O O O O O O

62. I tend not to worry about things
Very unlike me Very like me
O O O O O O

63. My teammates would describe me as a consistent person
Very unlike me Very like me
O O O O O O

64. I tend to run through things over and over again
Very unlike me Very like me
O O O O O O

65. Before attempting a skill, I imagine myself performing it
Very unlike me Very like me
O O O O O O

66. My mood depends entirely on my sporting success
Very unlike me Very like me
O O O O O O

67. I work through set backs
Very unlike me Very like me
O O O O O O

68. I wish I had more discipline
Very unlike me Very like me
O O O O O O

69. I incorporate mental rehearsal in my practice
Very unlike me Very like me
O O O O O O

70. Compared to my teammates I often fail to complete a heavy training session
Very unlike me Very like me
O O O O O O

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71. When things seem hopeless, I still keep going
Very unlike me | Very like me
O O O O O O

72. I struggle to get myself motivated
Very unlike me | Very like me
O O O O O O

73. When I am failing, I worry most about what others think about me
Very unlike me | Very like me
O O O O O O

74. I have lost interest in socialising with my training group
Very unlike me | Very like me
O O O O O O

75. I prepare carefully for training sessions
Very unlike me | Very like me
O O O O O O

76. I often feel nervous
Very unlike me | Very like me
O O O O O O

77. I get annoyed very easily
Very unlike me | Very like me
O O O O O O

78. I feel tired and have little energy more often than my peers
Very unlike me | Very like me
O O O O O O

79. Before I arrive at a performance venue, I mentally rehearse my performance there
Very unlike me | Very like me
O O O O O O

80. I sometimes feel down without really knowing why
Very unlike me | Very like me
O O O O O O

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81. When I have to do something that worries me, I imagine how I will overcome my anxieties and perform successfully

Very unlike me | Very like me

O O O O O O

82. When I am failing, significant others are often disappointed in me

Very unlike me | Very like me

O O O O O O

83. I dislike asking people for help and advice

Very unlike me | Very like me

O O O O O O

84. When I make a mistake I find it difficult to get my focus back on task

Very unlike me | Very like me

O O O O O O

85. I get distracted thinking about how other performers are doing

Very unlike me | Very like me

O O O O O O

86. I do certain things that are bad for me if they are fun

Very unlike me | Very like me

O O O O O O

87. When I am failing, I am afraid I might not have what it takes

Very unlike me | Very like me

O O O O O O

88. I have a hard time breaking bad habits

Very unlike me | Very like me

O O O O O O

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L. Paper-Based PCDEQ2 Score Sheet

Psychological Characteristics of Developing Excellence Questionnaire 2 (PCDEQ2) Scoring Sheet

Enter scores from 1-6 into sheet and add up each box. Reversed items scores as 7 – ANSWER
Divide factor total by number of items for final Factor Average Score

Factor 1: Adverse Response to Failure (21 Items)

Item	#3	#5	#7	#17	#21	#22	#27	#28	Sub Total
Score									

Item	#37	#40	#42	#46	#53	#61	#62	#73	Sub Total
Score							7-		

Item	#76	#80	#84	#85	#87		
Score						TOTAL	
						FACTOR AVERAGE	

Factor 2: Imagery and Active Preparation (15 Items)

Item	#9	#15	#23	#24	#25	#32	#33	#44	Sub Total
Score									

Item	#58	#59	#64	#65	#69	#79	#81		
Score								TOTAL	
								FACTOR AVERAGE	

Factor 3: Self-Directed Control and Management (14 Items)

Item	#4	#29	#30	#31	#35	#39	#47	#51	Sub Total
Score	7-		7-		7-	7-	7-		

Item	#55	#60	#68	#75	#86	#88		
Score	7-	7-	7-		7-	7-	TOTAL	
							FACTOR AVERAGE	

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Factor 4: Perfectionistic Tendencies (10 Items)

Item	#2	#20	#34	#41	#43	#48	#56	#66	Sub Total
Score									

Item	#77	#82		
Score			TOTAL	
			FACTOR AVERAGE	

Factor 5: Seeking and Using Social Support (9 Items)

Item	#1	#8	#11	#18	#26	#36	#45	#52	Sub Total
Score						7-	7-	7-	

Item	#83		
Score	7-	TOTAL	
		FACTOR AVERAGE	

Factor 6: Active Coping (10 Items)

Item	#6	#10	#12	#14	#16	#50	#57	#63	Sub Total
Score						7-			

Item	#67	#71		
Score			TOTAL	
			FACTOR AVERAGE	

Factor 7: Clinical Indicators (9 Items)

Item	#13	#19	#38	#49	#54	#70	#72	#74	Sub Total
Score									

Item	#78		
Score		TOTAL	
		FACTOR AVERAGE	

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M. Publications and Presentations Emanating from this Thesis

Hill, A., MacNamara, Á., & Collins, D. (2015). Psycho-behaviourally based features of effective talent development in Rugby Union: A coach's perspective. *The Sport Psychologist, 29*(3), 201-212. doi:10.1123/tsp.2014-0103

Hill, A., MacNamara, Á., Collins, D., & Rodgers, S. (2016). Examining the role of mental health and clinical issues within talent development. *Frontiers in Psychology, 6*. doi:10.3389/fpsyg.2015.02042

Hill, A., MacNamara, Á., & Collins, D. (under review). Survive or thrive: The impact of fear of failure on talent development.

Hill, A., MacNamara, Á., & Collins, D. (under review). Development and initial validation of the Psychological Characteristics of Developing Excellence Questionnaire version 2 (PCDEQ2)

Hill, A., MacNamara, Á., & Collins, D. (in preparation). Investigating the discriminant function of the PCDEQ2

MacNamara, Á., & Hill, A. (April, 2014). *Individual Characteristics of Developing Elites: What they need, can you measure it, and how can you give it to them?* Presented at the Talent Development Symposium, Institute of Coaching and Performance, Preston, UK.